

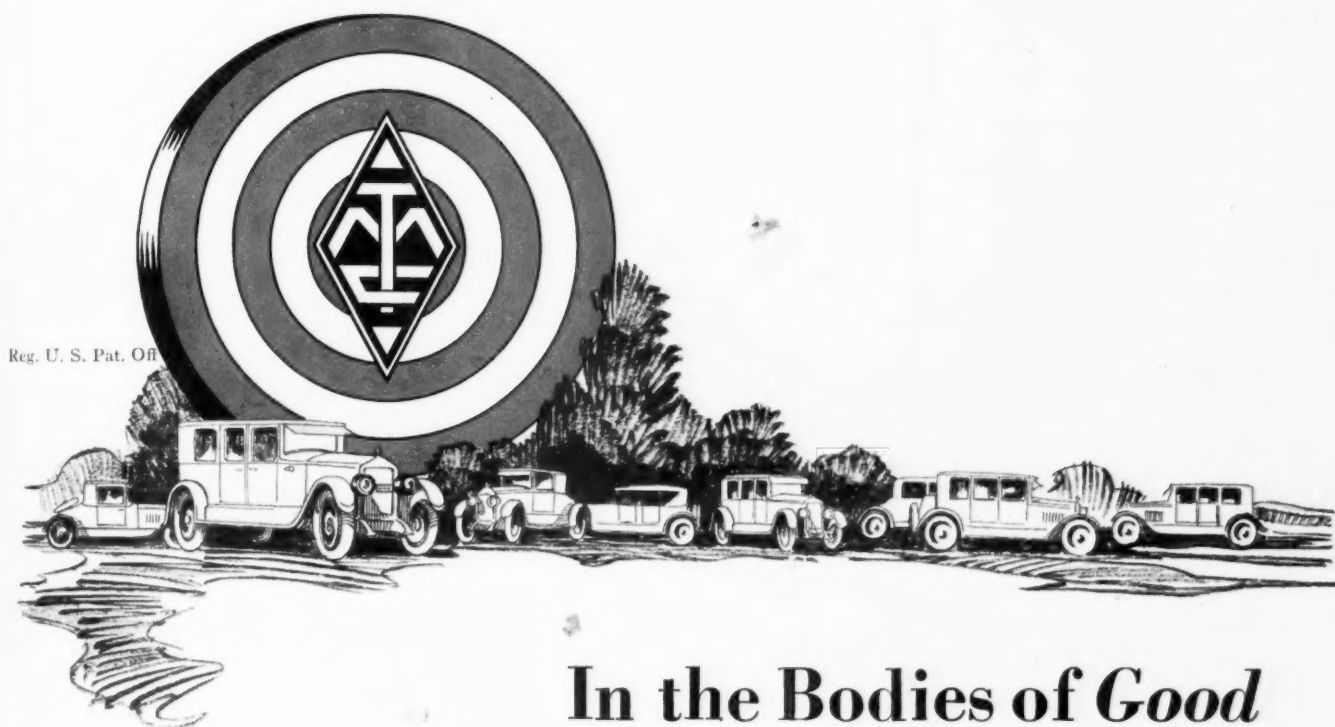
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLVIII
Number 11

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It is worthy of note that in the bodies of those motor cars, most firmly fixed in the public mind as *good* motor cars, a decided preference is evidenced for Ternstedt *proved-in-service* products.

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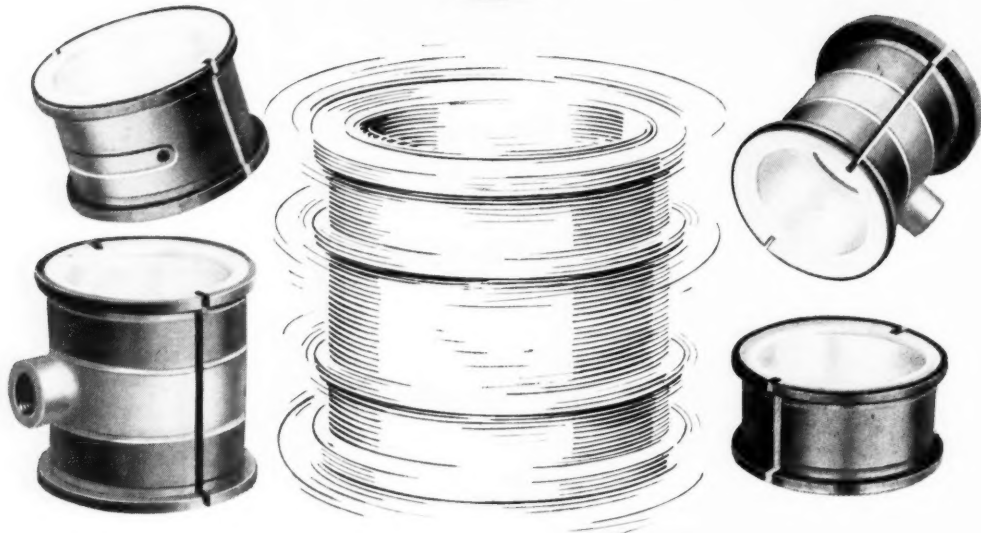
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Consider, then, the vital importance to the automotive manufacturer of these famous Federal Bronze Backed Babbitt Lined Bearings.

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The Federal Bearing Corporation is an Institution with years of continuous success behind it. Its commitments are literally lived up to. You can depend upon this Company—both as to quality of product and dependability of service.

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AUTOMOTIVE INDUSTRIES

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NEW YORK—THURSDAY, MARCH 15, 1923

No. 11

New Impetus Given Standards by Washington Meeting

Simplification Conference Committee formed to promote use of standards. Efforts will be chiefly of a merchandising character. All branches of industry represented. S. A. E. work endorsed by speakers. M. L. Heminway named chairman.

By Norman G. Shidle

NEW impetus was given the movement for simplified practice and standardization when representatives of all branches of the automotive industry met in Washington last Friday and formed a Simplification Conference Committee. The committee will devote itself chiefly to selling the idea of simplification and to furthering the use of standards already set up by the Society of Automotive Engineers. It will also aid in coordinating the work of standardization and in facilitating the development of present activities along this line.

It is significant that there was no argument at the meeting about the value of standardization. Everybody favored the extension of standards work, yet everybody recognized the need for wider application of its results. Representative manufacturers, engineers, service men and users all pointed out the advantages of simplified practice and praised the extensive benefits already obtained by the automotive industry through its application.

But despite extensive use, hundreds of standards already have been set up by the S. A. E. which are not in general use. A peculiar situation exists in which engineers of various factories adopt certain standards as engineers and then fail to utilize them fully when acting as members of their individual

manufacturing organizations. The N. A. C. C. supports S. A. E. standardization work financially and actively, yet its individual members have not taken full advantage of the constructive results turned out by the engineering society.

Basically there can be no doubt that all automotive agencies appreciate the ultimate possibilities of simplified practice. That is shown by the extent to which the industry has already developed standards and by the support that has been given such activities in the past. A definite need appears, however, for keeping the idea fresh and for awakening the entire industry to more immediate action in certain instances. The Simplification Conference Committee was formed with something of this thought behind it.

THE committee includes members chosen from each of the chief divisions of the automotive field. M. L. Heminway, General Manager of the Motor & Accessory Manufacturers' Association, has been made permanent chairman of the committee, and Carey E. Quinn of the Automobile Body Builders' Association, secretary.

The Washington meeting was held at the suggestion of the Division of Simplified Practice of the Department of Commerce and marks another step in

the elimination of waste program fathered by Herbert Hoover.

The subject of standardization was discussed from every angle. The manufacturer, the parts maker, the service man and the car user each presented his view of this important movement. The benefits of standardization are so well known in the automotive world that no difference of opinion developed on this score.

THE actual use of standards in the industry, however, is not commensurate with the value of such standards as expressed by the various speakers. A definite need for some better method of getting existing standards put into practice has been evident for some time. This thought developed throughout the discussion and was crystallized by G. W. Brogan, representing the Service Equipment Associates, when he said:

"Standardization has been well developed by our industry from a manufacturing standpoint. What is needed now is a sales organization."

It was upon this basis that the committee was finally formed, although certain other ideas as well are incorporated in the motion which resulted from the discussion. The motion read as follows:

"A committee of not less than eleven shall be appointed by the chairman to assist the S. A. E. to sell the standards now in existence and to get those standards more widely adopted; and further to assist in such other problems of simplification as may be determined upon."

It is expected that this committee will function in an active way. Chairman Heminway, commenting on the fact that standardization committees in the past sometimes have been prone to neglect very definite activities, said:

"We are going to see that this Simplification Conference Committee does a real job. It is planned to decide upon a few specific things that can be done at once and then start to work. Widening the scope of the committee and more general action can come at a later time."

A number of S. A. E. standards already adopted obviously should be in more general use. In many of these instances there is no logical reason why a given standard should not be universally incorporated in automotive design. The heavy force of inertia constitutes the chief reason that certain of these standards do not have wider use. The first task of the committee will be to overcome this inertia in connection with some of the more obvious cases.

Representing all of the major units of the industry and working through various association committees, the Simplification Conference Committee should be able to point to some definite achievements within twelve months. The committee will have the support of the trade press as well as of important executives throughout the industry. Its opportunities for service are very real and there is every indication that it will accomplish some constructive work.

The new committee will support and supplement the standards work that the Society of Automotive Engineers has carried on so successfully for many years. The machinery set up by that organization for the making of standards will be "lubricated" in every way possible and the product of that machinery will be merchandised to the entire industry.

Thirty-eight automotive men attended the gathering. Among those present were the following: Neal G. Adair, Motor World; D. W. Burke, Automotive Electric Service Assn.; C. F. Clarkson, Society of Automotive Engineers; H. R. Cobleigh, National Automobile Chamber of Commerce; J. H. Collins, Chilton Co.; James Dalton, Automotive Industries; N. C. Damon, National Automobile Chamber of Commerce; A. E. Dodd, Domestic Distribution Dept., U. S. Chamber of Commerce; M. O. Eldridge, American Automobile Assn.; George W. Ellis, National Hardware Assn. of U. S.; D. C. Fenner, National Automobile Chamber of Commerce; George A. Fernley, Automobile Accessories Branch of National Hardware Assn.;

A. J. Grimm, Automotive Equipment Assn.; C. C. Hanch, Lexington Motor Co.; M. L. Heminway, Motor & Accessory Manufacturers Assn.; E. V. Hennecke, Moto-Meter Co.; A. W. Herrington, Motorcycle & Allied Trades Assn.; M. H. Hoepli, Automotive Division, Bureau of Foreign & Domestic Commerce; P. E. Holden, Fabricated Production Dept., U. S. Chamber of Commerce; William S. James, Bureau of Standards; Clyde Jennings, Motor Age; Pyke Johnson, National Automobile Chamber of Commerce and National Automobile Dealers' Assn.; E. E. LaSchum, American Railway Express Co.; George L. Lavery, Tire & Rim Assn. of America; A. D. T. Libby,

Automotive Electric Assn.; George L. Markland, Jr., American Gear Manufacturers Assn.; E. W. McCullough, Fabricated Production Dept., U. S. Chamber of Commerce; T. D. Pratt, Motor Truck Assn.; G. H. Paine, Domestic Distribution Dept., U. S. Chamber of Commerce; Carey E. Quinn, Automobile Body Builders Assn.; E. J. Rabidoux, Automotive Service Assn.; Harry H. Semmes, Automobile Body Builders Assn.; Norman G. Shidle, Automotive Industries; Col. Edgar S. Stayer, U. S. Army, War Department; Carl W. Stocks, Bus Transportation; M. R. Tisne, National Hardware Assn. of U. S.; R. W. Trullinger, American Society of Agricultural Engineers; George Walther, Automobile Metal Wheel Assn.

FUTURE development of simplified practice was discussed from many angles, and the work already done was praised. E. E. LaSchum of the American Railway Express Co. paid a great tribute to the motor truck when he said that "from the standpoint of reliability and service, the modern motor truck is the most perfect machine ever built." He went on to point out that standardization had enabled their company, operating huge fleets of trucks, to reduce costs to a minimum and to give reliable service. LaSchum thinks that further standardization will improve the present situation, but feels that

AUTOMOTIVE standards have been efficiently manufactured for many years. A concerted effort is now being made to merchandise them more effectively. Every company can help the movement and benefit by it.

The engineer has been doing his part in standards work. The general executive will have to lend more active aid if the efforts of the technical man are to have maximum usefulness.

This article tells about a meeting held in Washington last week at which plans were laid for selling simplified practice in the automotive industry. Herbert Hoover is behind the idea and his Division of Simplified Practice is going to help it along. The story of the meeting and its developments is of interest to every executive.

a great debt is already owed to the truck industry for the excellent vehicles it has developed.

A DESIRE for profits alone in the automotive industry will demand in the future more attention for standardization than in the past," said C. C. Hanch, vice-president of the Lexington Motor Car Co., in talking about the importance of simplified practice work. Hanch pointed out that the Society of Automotive Engineers has borne the burden of standardization work and that it is entitled to more support than it has had.

Three factors are concerned in standardization work, he went on to say. These three are the manufacturer, the distributing agencies and the user. Standardization suggestions should be welcomed from all sources, especially from the service men. Standards should be sold before official adoption as well as afterwards. Otherwise manufacturers are likely to resist efforts to force into use certain standards, feeling that an attempt at coercion is being made.

Hanch suggested that the work of selling standards begin with those things which most directly affect the car user. These items have a very direct bearing on sales and service and will probably return a more immediate profit to the manufacturer than any other type of standard. This is a constructive suggestion which the Simplification Conference Committee may well adopt in its consideration of an immediate program of activities. Hanch mentioned specifically the gear shift standard which has been set up for years, but which has not been universally adopted. He cited some recent experiences of his own to show the trouble caused to the car owner by lack of standard practice in building this part. Other suggestions for immediate consideration were caps for gas tanks, battery carriers, etc.

Effort should next be made to get wider adoption of standards dealing with interior parts of the car, Hanch believes, parts with which the average owner is not familiar and which he rarely, if ever, sees. The deadline of standardization, Hanch thinks, lies in external features of the car. No standardization efforts should be made in connection with these parts.

This outline of simplified practice possibilities given by Hanch met with general approval by the conference and is likely to form a basis for future procedure.

The basis of the entire effort lies in a realization on the part of executives in every branch of the automotive industry that the wider adoption of standards will eventually mean money in their pockets. Briefly outlined by the Division of Simplified Practice, the major benefits of standardization are:

| It Decreases | | It Increases | |
|------------------|---------------|------------------------|----------------|
| Stocks | | Turnover | |
| Production Costs | | Promptness of Delivery | |
| Selling Expenses | | Foreign Commerce | |
| Investment | | Quality of Product | |
| Cost to User | { Initial | Profit to | { Manufacturer |
| | { Accessory | | { Distributor |
| | { Maintenance | | { User |

THE everlasting practice of "passing the buck" came in for some interesting comment during the simplified practice discussion. C. C. Hanch referred to it by outlining what he said was not uncommon procedure when a dealer reports trouble with a certain part to the factory service manager. The service manager goes to the engineer, tells him the "kick" and says "What is the matter?"

The engineer goes over the drawing for the part and says: "That part is designed according to correct engineering principles and it is all right. If that darned pro-

duction department would just make it the way it is designed there wouldn't be any trouble."

Then the service man hies him to the production man and tells the story again. "Well," the production man says, "if that engineering department of ours would use a little common sense in designing parts, it might give us something that its humanly possible to build on a production basis."

The cycle is ended when the service man writes back to the dealer saying something like this: "We have not been having this trouble anywhere else, and so were surprised to hear about the difficulty you have been having with this part, etc., etc."

Coker F. Clarkson touched on the same topic when he told this story: Trouble with a certain part had been reported to the general manager. He called in his chief engineer and said to him: "I suppose you calculated very carefully in designing this part?"

"Yes, very carefully," was the reply.

"Then for heaven's sake guess at it the next time."

The point was made by these speakers that a wide application of standards undoubtedly has a beneficial effect in reducing the need for alibis and "buck passing."

A. J. Grimm outlined the standardization work of the Automotive Equipment Association, while A. D. T. Libby told of the recent standardization activities carried on by the Automotive Electric Association. Libby showed that the special standards work of his association is not in conflict with the idea of centralizing such work at the S. A. E., since the A. E. A. work deals with problems of a commercial character.

A WEALTH of constructive thought was developed in this conference. The work of the Simplification Conference Committee will have the active support of Herbert Hoover and the Division of Simplified Practice. This Division will extend its cooperation in every way possible, but is making no attempt to direct the activities of the committee. William A. Durgin, Chief of the Division of Simplified Practice, emphasized this point strongly in his brief address which opened the session. R. M. Hudson will represent the Division of Simplified Practice in its active contact with the Simplification Conference Committee.

The success of the work depends largely upon the active support given it by executives in the industry. This support should be freely extended, as the probable benefits to be derived from the work of the committee are commensurate with any efforts that may be given to make it successful.

Sheet Steel Committees Meet

A RECENT joint meeting of the Sheet Steel Committees of the Society of Automotive Engineers, the American Society for Testing Materials and the American Society for Steel Treating, a Committee on Testing of Sheet and Strip Steels, consisting of J. M. Watson, chairman, Hupp Motor Car Co.; C. N. Dawe, Studebaker Corporation of America; F. E. McCleary, Dodge Bros.; Jack Dailey, General Motors Corporation; L. A. Danse, Cadillac Motor Car Co.; and E. W. Upham, Maxwell Motor Car Co., was appointed.

The Committee was given full power to fix the methods of testing and to obtain help from men not on the Committee. All tests are to be made in the manner prescribed by the Committee, which will send monthly reports on the work to the S.A.E. Standards Department for distribution among the subdivision members.

Show Manager Says Car Exhibitions Should Be Improved

Extraneous features chief cause of high expense. Radical changes in design infrequent. Equipment manufacturers will play more important part in future. Public interest great, but improvements are possible. Elimination of waste needed.

By Herbert Buckman*

Manager, Cleveland Automobile Manufacturers and Dealers Association; Vice-President, National Association of Automobile Show and Association Managers

HERE is the reply of a show manager to the criticisms recently leveled at the annual automobile exhibitions. He agrees with the critics about the need for eliminating waste and extravagance in entertainments, but says that high expenses have been piled up by sideshow features rather than by the shows themselves.

The article contains, also, some interesting comments on the policy of leading equipment and accessory manufacturers which confine their exhibits to the two national shows. Buckman believes that this policy is too limited.

THE automobile industry cannot afford to brush aside the criticisms leveled at the annual shows by Norval Hawkins. Merely to enter a blanket contradiction is not sufficient. More especially those of us primarily interested in the shows must weigh and analyze the claims of such an authority as Hawkins that the shows do not serve the purpose for which the expenditure of money is intended.

While Hawkins' criticism was directed at the national shows, it is worth noting that the show situation has changed in recent years and there have been developed in other cities shows that are at least to the level of the national affairs of some years ago. Therefore, it behooves the men who are putting their good money into these expositions to see whether there is in the criticism of these events material on which to base improvements.

The shows should be improved.

Merely because crowds increase and more cars are sold and a good rate of dividend is earned is not a sufficient measure of success. Let those of us identified with shows over a period of years not sit back on our supposed laurels and point to the big crowds and successful merchandising and say—what else is there to it?

I do not mean to suggest that radical departures should be made in the time of holding our shows just for the sake of making a change. The writer is among those who opposed a change from the early weeks of the year as the time for staging the annual exhibitions. That would be a superficial change. But what of the shows themselves?

Paste this on your windshield and keep it before you in the further consideration of this treatise—if you venture that far.

The cars themselves no longer change enough from year to year to excite a tremendous interest.

We are coming back to that point later, but for the present let us revert to that primary item of expense. The way to the automobile magnate's interest is through his pocketbook, so let us set this out as a platform for the show campaign—

(1) If the shows are too expensive, it is because the extraneous and sideshow features have piled up the expense accounts.

(2) Concerns, particularly in the accessory field, must be ready to spend more money on the shows themselves.

(3) There must be added elements of interest in the exposition besides the car refinements that are more or less apparent from year to year.

Indirect Activities Too Costly

The first two propositions are related and interdependent. When Mr. Hawkins or anybody else avers that the shows are growing too expensive, does he mean the shows proper or all the side features and outside stunts that are charged against the show account? It is time for the line of demarcation to be drawn between the direct cost of the shows on one side and on the other side, the gorgeous suites of rooms, the operatic dinners and other entertainments, the inundation of hooch, the over-generous advertisements and the sideshows in this, that or the other hotel or other location. Is there not an inclination to overlook the importance of the show of and by itself in the myriad side activities that cost time, trouble and money?

I have no personal antipathies to libations of what has come to be contraband liquid; neither am I so ancient as to disregard without a certain degree of interest the

*Reprinted from Motor World, March 14, 1923

gyrations of the more or less classique dancers. But if the expense of the shows is becoming too burdensome, I am wondering if some such features cannot be reduced without abolishing the shows entirely.

Lest I be accused (among other misdemeanors) of treating with levity so serious and costly a subject as our annual shows, let me go at once to the relationships of the important and leading accessory and parts concerns to our yearly exhibitions. There are three national organizations, the members of which have, at least, an understanding to stay out of the local shows. By that I mean all except the New York and Chicago enterprises. Since those rules were made there have been several other shows developed to a point of interest and value approaching that of the national shows at the time such understandings were formulated. For leading national concerns to tell the world that they cannot discriminate among the rest of the shows of the country is to admit a greater lack of perspicacity than they should be accused of. If some of these big concerns were not now spending more money and effort on these local shows than a space actually would cost them, this article would not be written, but I can cite one or two instances which I believe will be recognized as typical in several cities.

Money Spent Unwisely

One instance is a big tire company that would not under existing agreements exhibit in a local show. For weeks before the exposition their branch manager is busy trailing and entertaining the sales managers of the leading car exhibitors to put his tires on their show cars. His expense account in connection with this is liberal to say the least. During the weeks of the show he buys a lot of tickets and does several other things in connection with the show that cost considerable money. Maybe some spectators at the show actually will notice the tire equipment on the cars they are inspecting, but how much better it would have been for the same tire concern to invest a similar amount of money on a real space in the show to educate a hundred thousand people on their product!

Let us next consider a bumper concern. There is a self-imposed prohibition against taking space in the local shows or sharing in the expense of same. But oh! the cigars its local manager bought in an attempt to get their bumpers on some of the cars exhibited in the show. And he and his associates actually spent more of their firm's time trying to get their bumpers on certain show cars than they would have spent in preparation of an interesting display of the article itself in the accessory division.

The next case, ladies and gentlemen, is an oil company. This company could not (under its policy) pay for a space in the show, but it could pay for a page advertisement in the show program. The former was show and the policy could not be violated. The program was advertising and so charged to a different account. So the representative took a page in the show program at \$140, while for \$170 the concern might have bought one of the best spaces in the show proper. They paid \$140 to offer a picture to one-fifth the number of people who would have seen the product itself in an interesting exhibit.

But when the bills come in, blame the shows!

There is another serious side to the accessory story.

While the leading concerns are prohibiting themselves from paying for real space, the shows are selling their space to concerns of lesser standing. If the accessory space is sold, it is occupied in many cases by less important, less reliable, less worthy concerns. The advantage is all in favor of the concern that will spend its money on a show space as its chance of recognition and

salvation. No show wants unreliable or unworthy exhibitors, but there is no justification for barring out a concern with an interesting exhibit even if it be felt that its life may be short. Such prognostications, or decisions barring exhibits on such ground, are hazardous.

I have never heard it denied that the accessory concern, no matter how big or important, did not benefit by these great expositions of our industry. But they are doing little or nothing to support them and are instead pursuing a policy that would eventually work harm to the very shows that they ought to be supporting.

The time is here when the important accessory and parts concerns should cooperate with some of the bigger exhibitions so that the accessory departments are interesting and adequately representative.

Throughout, shows must be increasingly interesting.

Unless we are willing to admit that the year to year improvements on cars are no longer so radically apparent, we shall make slight progress in the proper direction. No one questions that worthwhile improvements are being made in the cars, but these improvements become less and less obvious to the show observer. Will Rogers said, show week, that he spent 75 cents to see the same cars that he could have seen the week before along the curb for nothing. Rogers has no monopoly on that sentiment if the men in the automobile industry will open their eyes and ears to a realization of it. The expression of that idea does not reflect one iota on the improvements being made in cars, but it recognizes that these changes are more obvious on the road and in the wear and tear than in an exhibit.

We must put more significance into the shows.

The day is past for tawdry, bunting decorations and cars standing around as if in a garage. We must have exhibits and attractions of an instructive and interesting nature. By this I do not mean style parades or lost person contests or third-rate vaudeville stunts. But surely out of the multifarious uses of the motor car and its innumerable points of contact with many sides of life we can find features that will add to the significance and importance of the shows in selling the industry and its products to the populace.

Show Value Must Be Increased

There are persons in the industry who realize that such things must be done instead of remaining in a condition of self-satisfaction. The public has not forced us to it yet, but let us make the improvements and betterments in the shows ahead of actual forcing by the public. Let us increase the interest instead of letting it flag before we put new enthusiasm and new life into our expositions.

There is no other industry in the world that profits by anything like our string of automobile shows. That disproves many of Hawkins' sweeping assertions. If that were not true, other lines of business would not be trying to adopt or adapt the show idea as developed and practiced by the automobile industry. But let us not surrender our leadership. Let us eliminate the wastes and senseless extravagances, but let us amplify and develop the strength and sources of power.

R EPORTS received by the Department of Commerce from American consular agents stress the necessity of price cuts in England to revive the demand for American automotive products.

It is also reported that only seven British automotive manufacturers showed profitable operation during the past year. Price reductions had a tendency to stimulate trade, but the year's output did not exceed thirty or forty thousand cars and trucks. The price cuts averaged from 10 to 35 per cent, the latter affecting low-priced models.

Electric Brake and Axle With Reverse Gear Are Successful Railcar Units

Modified truck chassis with braking system, axles and wheels especially designed for railway service has proved itself capable of competition with buses. 3 to 1 gear reduction found desirable. Averages over 12 miles per gal. of fuel.

By Donald A. Hampson

A RAILROAD which is financially strong is more anxious to reduce the expenses of an existing traffic than to increase riding; it can borrow money on more favorable terms and can carry the interest and depreciation charges for a longer time—therefore, the high priced railcar appeals. On the other hand, the road which is financially weak is interested in a car that will build up traffic and show net earnings sufficient to amortize itself in a few seasons,—hence this road buys the less elaborate car.

Up to the present time, the less elaborate type of railcars have all been built around motor truck chassis. Four, six, or eight flanged wheels have been substituted for the four rubber tired ones and the chassis fitted with a body intended to suit the user's ideas and money, either a stock bus body, a home made one, or perhaps a special body.

These cars have done most of the pioneering in the railcar field. Some of them imposed a severe tax on the funds and patience of the management—"We just get the people riding with us when something goes wrong and we have to abandon half a dozen trips," one executive was heard to complain. Yet many of the early railcars have been and are successful, as judged by a curve plotted between cost and performance.

A railcar which has been more than ordinarily successful is shown in Fig. 1. It belongs in the motor truck class, the chassis being a Gramm-Pioneer Model 30 with some modifications. Besides an assembly that is different from the usual railcar job, there are certain features that are new to this work and the car is the more interesting because of its good performance.

This car is owned by the Middletown & Unionville Railroad and was put on the line in September, 1921, displacing one of two earlier cars. This road has been using railcars since 1917, hence its experience is the more valuable and it illustrates how a willingness to put up with minor shortcomings in order to gain the advantages of a moderate priced railcar can show profitable operation on the company's books.

This car has 165 in. wheelbase, 231 in. body space and measures 34 in. from rail to top of frame. The two rear driving wheels are of 33 in. dia. and the wheels of the four wheel leading truck are spaced on 36-in. centers. The rail load on rear wheels, car empty, is 5010 lb. and fully loaded 9030 lb. Corresponding figures for load on front wheels 3590 and 4530, respectively.

The engine is a Hinkley $4\frac{1}{4} \times 5\frac{1}{2}$, 29 hp. N. A. C. C. rating.

The gearset is four-speed, individual clutch type, set amidship.

The clutch is a dry disk type.

Rear axle is a Sheldon worm type having ratio $4\frac{1}{2}$ to 1. Drive and torque are taken through the springs.

Brakes bear on drums of 18 in. diameter located on the rear wheels. Equalizers are used on both service and emergency brakes. Brake shoes on front truck wheels, applied on 18 in. brake wheels.

Universals are flexible disks with two-bolt fastenings.

There is seating capacity for 31 passengers.

The car is capable of a speed of $28\frac{1}{2}$ miles per hour on level track.

The governor prevents speeds in excess of 1300 r.p.m. so that the engine operates most of the time at little over 1000 ft.p.m. piston speed, thus insuring a useful life far in excess of that of high speed engines.

Practically all running is in high (direct) gear, the lower speeds being used solely for starting and shunting about the yards. This in spite of the numerous grades and sharp curves on the line. At one point there is a quarter mile of 3 per cent grades occurring on sharp reverse curves cut through a hill which shuts off view of main-road crossings at each end, making it unsafe to approach the grade at more than 4 m.p.h., yet the engine does this on high with full load plus a four-ton trailer and shows no sign of laboring.

One filling of oil in the crankcase does for two weeks and would undoubtedly last much longer but the practice of changing oil at regular intervals has been followed.

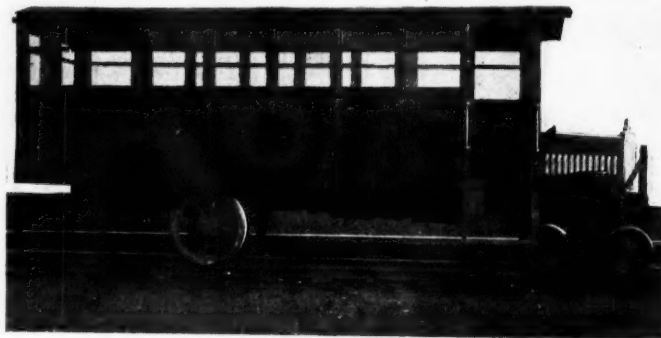


Fig. 1—Railcar built around modified Gramm-Pioneer truck chassis

An average of better than 12 miles per gallon of gasoline is made month after month, some months showing as high as 13 miles. In the opinion of the writer, this is a record performance that proves the correctness of rugged engine design, slow speed without forcing, and a low (numerical) gear ratio.

Though the maximum speed is less than 30 m.p.h., a high average road speed is possible because this maximum is attained so quickly, and then maintained without losing time at every grade. A round trip of thirty miles is made on an eighty minute schedule which includes ten regular stops, six possible flag stops, and half a mile of running in reverse at one terminal.

Just as the motor truck user secures longer service out of his machine by not exceeding builders' rated loads, so does the railcar show greater all around economy by keeping within these limits. The body weight on this M. & U. car is 2600 lb. and the passenger-and-crew weight is 4960 lb.—well under the rated capacity. Some interesting ratios are drawn from these weights and the chassis weight of 6000 lb. The ratio of car weight to seating capacity is probably the lightest that is giving satisfactory service. Based upon engine horsepower at the governed speed the car weighs 398 lb. per hp. full load or 250 lb. per hp. light. There is 1.2 hp. per passenger and the weight of car per passenger is 292 lb.

The radiator guard is a new feature on railcars and has demonstrated its value a number of times. A blow such as any yard crew man might strike would put a delicate unit such as a radiator completely out of business. This has been done a number of times by a stick of timber carelessly handled in the yard or car barn or by a tool or bar swung around in a tight place.

Transmission units are so arranged that there are no long drive shafts. The amidship gearset, of more than usual length, breaks up the power line into five shafts, three of which are supported by ample bearings in cases and none of which are long enough to cause whip even if run at double their maximum speed. A trouble that has been experienced with the flexible disk universal—tearing out the holes or loosening up enough to unbalance the shafts—has been eliminated in this design by the use of four disks and double-bolt fastenings—a construction that is substantial and maintains its concentricity.

On the M. & U., the railcars are manned by a driver and a conductor, are dispatched the same as the steam trains and have rights over second class traffic.

A view of the driver's controls is seen in Fig. 2. This shows a number of interesting points, made clearer by the removal of the driver's seat from the post in the foreground.

Electric Brake Has Many Advantages

The usual switches and instruments are mounted on the dash and the gasoline gage is seen at the left where the filler of the tank projects from under the only side-seat in the car. The sand shaking lever projects through the floor, in the foreground, to the right of and under the driver's seat. Conventional foot and hand controls are shown. The wheel is arranged to apply the front truck brakes. Gas and spark levers are under the wheel. A section of floor board has been removed so that the exhaust pipe is exposed. This "stove" arrangement of pipeless heating is used satisfactorily in cool weather for car heating. In cold weather, pipes through the car connected to a by-pass ahead of the muffler keep the interior at any desired temperature up to 78 deg.

The device attached to the steering column is of more than passing interest. It shows, incidentally, that parts

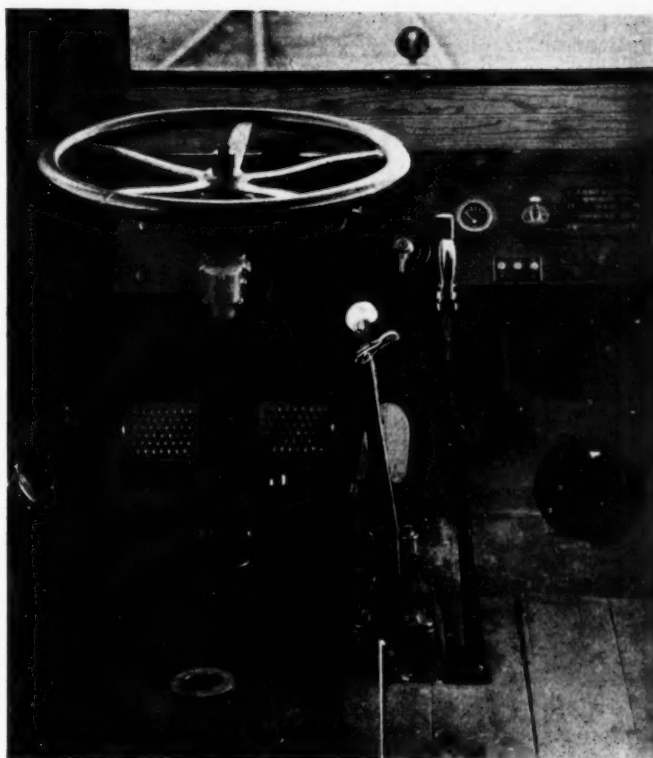


Fig. 2—Controls on the railcar described in the text. The electric brake control is located on the column under the brake wheel

and accessory manufacturers are turning their attention to the railcar field as well as are car manufacturers. It is an electric brake which is marketed by the Automatic Electric Brake Co. Power brakes are demanded by some railroad officials and are required in interstate traffic. Heretofore this requirement has been met with by air brakes, either of the Lane type which compresses air through the impulse of the engine piston or the straight air brake with air compressor.

Some strong claims can be made in favor of a good electric brake. It is not subject to freezing as are some air brakes, through neglect of condensation. It has no packings to replace, no valves, and but one unit which has any complication. The electric brake rounds out a car already electrically equipped and does not involve learning the principles of another mechanical system.

Since the electric brake has worked out well on this car and is adaptable to other automotive equipment as well, a brief description of this installation will be of interest. The brake is slung under the car frame, on the left side, a little ahead of the gearset. Fig. 3 shows details of the suspension and connections.

The brake consists essentially of an electric motor and a mechanical screw. The motor is series wound and takes its current from the 6-volt storage battery. It is a reversing motor, caused to revolve in either direction by right or left hand movement of the lever in the switch mounted on the column under the brake wheel. Through suitable gearing, rotation of the motor extends or withdraws the screw which is a part of the plunger projecting through the end of the brake cylinder. Connecting levers pinned to this plunger apply the band brakes through the regular system of rods and links. They might be attached to a conventional brake shoe mechanism acting directly on the rim of the wheel.

Two cables lead from the head of the brake—one to the driver's switch and one to the battery. The brake has no material effect upon the battery. The ammeter

points to 20 or 25 but flashes back immediately, as the application is only for a second. Without a generator the battery should be good for about ten thousand such applications; on the M. & U., from 100 to 150 applications will be made during four round trips.

In the layout, Fig. 3, the brake is suspended on $\frac{3}{4} \times 2\frac{1}{2}$ brackets. The plunger is attached to the bar L which is offset to clear the drive shaft and has its fulcrum at F. A brake rod is attached near the plunger end, spaced so that the leverage ratio is 16 to 23; with the thrust of 300 lb., which is the normal service application, this gives a pull on the brake rod of 430 lb. which is transmitted to the arm B of such a length that the application is twice the strength of average foot brake applications. The arm B is keyed to shaft A which carries the foot brake and the arm connected to the brake rod shown by dash lines, running back to the equalizer from which the service brakes on the rear wheels are applied. It will

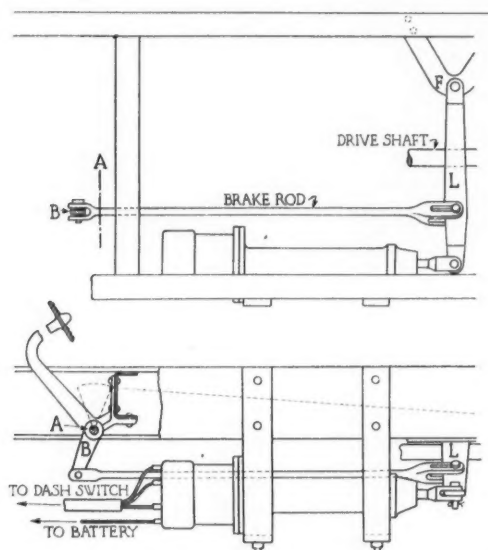


Fig. 3—Plan and side elevation of the electric and foot brake operating mechanism

be noted that the brake rod has a long slot for the pin through L to transverse—this permits independent operation of the foot brake at any time.

The electric motor is very fast. An application that extends the plunger its full ten inches can be made in a second. The application and release only use power, since the screw automatically holds the brake set indefinitely in any position without electrical energy. The control switch is automatically returned to neutral position when released.

Overcoming Bus Competition

Railcar salesmen will find worthwhile information in a study of the methods used to induce travel over the M. & U. line and the operating expenses of the service. The territory served is a farming country with the usual small villages; Middletown is the natural business center. The road runs to the New Jersey State line where it meets a spur of the Erie, which has been none too friendly in arranging convenient schedules so that people on the northern end of the spur were compelled to go much further in New Jersey to do their shopping than it was necessary to do if a short direct trip to Middletown could be made.

Most independent roads and local service on trunk lines are faced with bus competition. So it was on the M. & U. Bus lines operated over the paralleling State road and they had the advantages of (1) running through

to the large town of Sussex, N. J., (2) gathering passengers at their doors (3) carrying their passengers right into the business section of Middletown, whereas the railroad station was half a mile distant. The same rates prevailed for buses as on the railroad. Notwithstanding the advantages possessed by the bus men, railcar service on the M. & U. has literally starved out the former. So popular is the railcar service that it is to be continued throughout the winter months—the first time this has been done—and the winter schedule announces four trips a day instead of three as in the warmer months.

The cost of railcar operation is so low that more frequent service can be provided than with steam trains and these are arranged to suit the needs of the locality. For instance, one afternoon trip is scheduled to permit matinee attendance and the time most convenient for women shoppers. An extra trip is made Saturday night, with the return at 11:30, after theaters are out. Frequently a trailer is put on for the forty or more passengers leaving Middletown on this last trip.

Special Attention to School Service

Special attention is given to school service. Children in the rural section come in for all-day sessions at the high schools; home duties require their spending the least possible amount of time in town. The railcar makes one morning trip that lands pupils within a block of school ten minutes before opening time. This is made possible by stopping at a crossing some distance from the station—the flexibility of the gasoline car permits making this and pick-up stops along the way which were out of the question with a steam train.

Some idea of the returns from railcar operation on this, a typical installation under typical conditions, may be found in the following (Nov. 1922) reports.

| | |
|---|-----------------------------------|
| 107 round trips of 30 miles each = | 3210 miles. |
| 1981 paying passengers carried. | |
| 203 passengers riding on passes (M. & U. and Erie employees). | |
| 251 gallons of gasoline used. | |
| Each passenger paid an average fare of 30 cents = | \$594.30 as the month's receipts. |
| The operating expenses were: | |
| Gasoline | \$55.22 |
| Oil and waste | 5.20 |
| Crew (2 men) | 212.00 |
| | \$272.42 |

There were no expenditures for repairs during the month and none for car service as the crew did the cleaning and oiling around.

From the above summary it will be seen that there was a balance of \$321.88 at the end of the month. There must be deducted from this charges for depreciation (on an \$8,000 investment) and insurance; but after that is done, it will be found that operation is still carried on at a profit—and this in one of the poorest months in the year for riding. There is no reason to think that a steam passenger train over the same route would attract more people; and the actual cost for coal alone on this same round trip with a locomotive is \$14.60!

As further evidence of interest by parts makers and their entry into the railcar field on a commercial basis, the axle design in Fig. 4 is shown. This is strictly a railcar axle, specially designed and engineered by axle builders and stocked in varying capacities for railcar concerns.

Many features of interest are disclosed by a study of the cut, some of them quite different from former automotive practice. The axle is similar to double reduction axles, though in this design the construction was adopted

to provide greater rigidity at the center and at the same time permit the addition of a reverse mechanism in the same housing. The total gear reduction is 3 to 1, which confirms the opinion of the writer in this and other articles as to the desirability of keeping this ratio small.

Reverse Mechanism Proves Valuable

A reverse mechanism that is simple and sturdy is a feature that will appeal particularly to railroad men. It will be seen that the bevel pinion meshes constantly with two gears of the same size; these are made with integral clutch teeth at the inside end of the hub and in neutral position, they idle on ball bearings on a lay shaft. Between the bevels is the sliding member which has clutch teeth at each end and is internally splined to fit the lay shaft. This sliding member has teeth cut on its periphery and is the spur pinion in the set. It drives a spur ring gear. The clutch fork is actuated by the customary ball-located shift rod which has a connection outside the case and is controlled by a linkage attached to a lever convenient to the driver.

The axle shafts are splined into a dummy differential which carries the spur ring gear. No differential is employed, since its use is of doubtful value in railroad work. Divided axle shafts are used for manufacturing reasons and to make it possible to insert a new shaft at any time without disturbing the entire installation.

A number of these reverse gear axles have been in use under very severe conditions and, thus far, have developed no trouble whatever. It will be noted that the

design is extremely simple. And the parts are rugged without undue weight. It will also be apparent that the assembly lacks the multitude of small parts so common to automotive axles and so much disliked by railroad men when they have to take anything apart. The method of wheel fastening is so simple that the roughest laborer on the road could hardly fail to get a wheel on right.

Thrust from the wheel flange is transmitted through the inner race, which is in contact with a shoulder on the shaft, through the shaft on the other side to the bronze retaining plate. The drive shafts butt at the center, giving the same effect as a continuous shaft. Thrust produced when a lurch of the car throws it on the opposite wheel is taken care of in the same manner but the direction is reversed.

A single No. 317 Hyatt roller bearing, which has a capacity of 12,600 lb. at 500 r.p.m., is placed in the housing, close up to the wheel. The safety factor of the bearing is 4.25. Replacement is a simple matter if required.

AKRON rubber manufacturers are having the liquid "latex" from rubber trees in the British Colonial rubber producing belts shipped to them in large drums. Research chemists in several Akron factories are experimenting with latex in an effort to work it directly into tires without the intermediate steps of preparing crude rubber, such as coagulating, washing, drying and refining it. They also are experimenting along the line of making rubber fabric by impregnating the cotton fabric with the white milky juice from the rubber tree instead of putting the sheets of coagulated and washed rubber through huge mangers and colanders.

Although chemists here say the new methods of working the latex into the direct manufacturing process on tires does not mean a revolution in tire manufacture, they do claim that interesting possibilities seem certain.

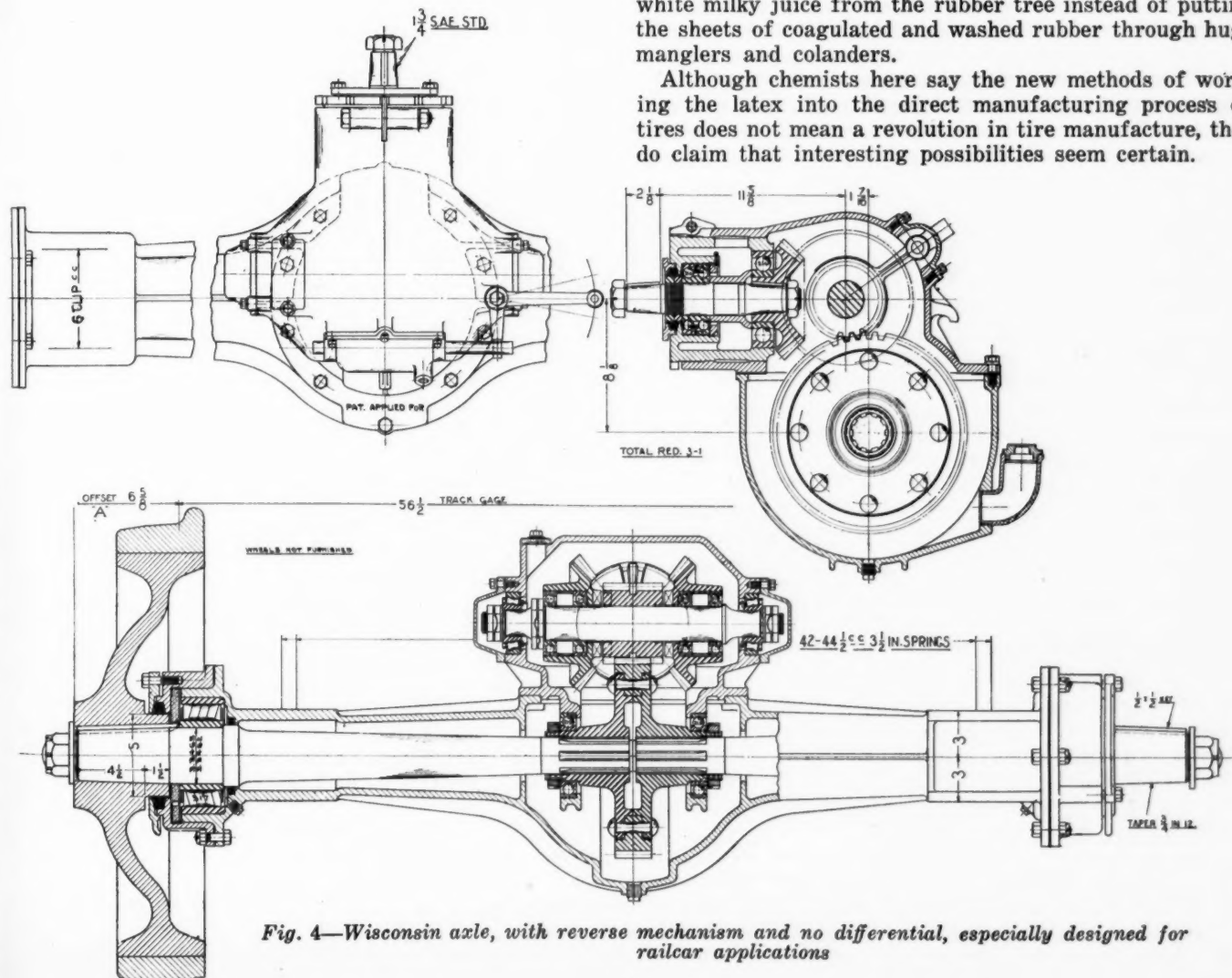


Fig. 4—Wisconsin axle, with reverse mechanism and no differential, especially designed for railcar applications

Revised Nomenclature for Radiator Cores Is Proposed

Radiator Division of S. A. E. Standards Committee considers that some changes are desirable in definitions suggested by AUTOMOTIVE INDUSTRIES. Revision of S. A. E. proposal is recommended for sake of clarity and to avoid confusion.

By Herbert Chase

IN AUTOMOTIVE INDUSTRIES for Nov. 16, 1922, we suggested three definitions for the more common types of radiator core, and expressed the hope that the Standards Committee of the Society of Automotive Engineers would consider these proposals with a view to adopting standard terminology which would in time find general acceptance throughout the industry. The suggestion has already borne fruit. The proposed definitions were referred to the Radiator Division of the S.A.E. Standards Committee, and were considered by that division at a meeting held recently in Chicago.

The minutes of this meeting indicate that the main features of the proposal were accepted, but that four instead of three standard definitions were proposed.

One of the chief differences between the original proposal and that advanced by the Radiator Division involves the dividing of the fin and tube type as defined by us into two types called by the division the individual fin and tube and the continuous fin and tube type. While there are doubtless good reasons for such a classification, the definitions which the division proposes to cover these two types are open to certain criticisms, the reason for which will be appreciated by reference to the accompanying table and the explanatory matter appended thereto.

It is hoped that the following criticisms of the suggestions contained in Column 2 will make apparent the reasons for the definitions proposed in Column 3.

In the first place, it would seem that the word assembly is better than the word number and that the word tube is preferable to the word passage, when a tube is meant. Since some cores are made up of water tubes and others of air tubes, it seems desirable to indicate in each definition precisely which type of tube is meant.

Definitions of Water Tube Type

The first three definitions in Column 2 refer in the last analysis to water tube types, the majority of which have some sort of fin or indirect radiating surface. For this reason it is very necessary, if confusion is to be avoided, to make the definition so specific that there can be no logical reason for confusing any one of the three types with either of the other two.

The most serious criticism of the proposed definitions advanced by the Radiator Division hinges upon this point. Take for example the definition 2—continuous fin and tube type—which reads: "A number of tubes of any cross sectional form assembled and joined together by fins or plates." This definition taken alone, and literally, would

apply to any of the first three types since they are all formed from tubes and in some examples of all types there are fins, while in all three the tubes are joined top and bottom by plates, sometimes referred to as header plates.

The original definitions proposed in Column 1, as well as those in Column 3, are intended to avoid any chance for such confusion, and most of the changes in the definitions proposed in Column 3 as compared to Column 2 are made with a view to greater clarity and to avoiding confusion which may otherwise come about.

Fine Distinctions Necessary

The distinction may seem rather fine in some cases, but it must be remembered that such a distinction is required in order to differentiate between types which are essentially quite similar, although they differ radically in their method of manufacture.

To illustrate this point, consider a ribbon cellular type radiator in which the cellular structure is partly formed by crimped ribbon. Although the tubes themselves are made from ribbon and are of a very thin, flat section, they are none the less tubes. Furthermore, they are joined by crimped strips of ribbon which in reality form a fin or indirect radiating surface. Hence it is quite necessary to so word the definition for the continuous fin and tube type as to prevent its being confused with the definition of the ribbon cellular type. Other examples of a similar nature will occur to anyone who gives the subject careful study.

One well known type of radiator, properly classed in the individual fin and tube type, is provided with a helical fin which is continuous from top to bottom of the tube. Hence, unless the definition is carefully worded, this type might be easily confused with the type called the continuous fin and tube type. There are a number of fine points such as this which will certainly cause confusion if the definitions ultimately adopted are not specific and worded with great care.

The word continuous, as applied to the fin and tube type, is intended to apply to a fin which is common to at least two and usually to several of the tubes composing the core.

So far as the writer is aware, all ribbon cellular types of radiators are formed from flat tubes, the width of which is equal to the depth of the core. Reference to this type of tube is made in definitions 1 and 2, Column 3, in order to avoid possibility of confusing the fin and tube types with the ribbon cellular type.

The difference as between the two definitions marked 3 and the two marked 4 (Columns 2 and 3) is of lesser im-

Suggested Definitions of Types of Radiator Cores

(Column 1)

As originally proposed in Automotive Industries, issue of November 16, 1922.

1. *Fin and Tube Type*

The fin and tube type radiator core is one made up from continuous water tubes over which fins are fitted. The tubes have various shapes of transverse section, but are not crimped and are not of that wide, flat type which is formed by joining two metal ribbons at each edge.

2. *Ribbon Cellular Type*

The ribbon cellular type of radiator core is one made up from continuous water tubes formed by joining two metal ribbons at each edge. The walls of the tubes are usually crimped and are so grouped as to form a cellular structure. In some cases a part of the cellular structure is formed by flat or crimped ribbon, which is not a part of the water tube walls.

3. *Air Tube Cellular Type*

The air tube cellular type of radiator core is one made up from air tubes which are nested in such a way as to form water passages between the tubes, these passages being sealed by soldering at the ends of the tubes. In this type of core the general direction of water flow is at right angles to the tubes, but the water can flow transversely as well as vertically through the passages between tubes.

(Column 2)

Revision proposed by the Radiator Division of the S. A. E. Standard Committee.

1. *Individual Fin and Tube*

A number of tubes of any cross-sectional form to each of which is attached gills or fins of circular, square or other shape, each tube and its fin or fins forming a separate unit.

2. *Continuous Fin and Tube*

A number of tubes of any cross-sectional form assembled and joined together by fins or plates.

3. *Ribbon Cellular*

A number of water passages formed by joining metal ribbons at the edges, the water-passage walls usually being crimped and grouped to form a cellular structure. Parts of the cellular structure may be formed by flat or crimped ribbon which is not a part of the water passage.

4. *Air Tube Cellular*

A number of air tubes nested in such a way as to form water passages between the tubes, the passages being sealed at the ends of the tubes. In this type the water may flow transversely as well as vertically around the tubes.

(Column 3)

Revision (of definitions given in column 2) proposed by Automotive Industries.

1. *Individual Fin and Tube Type*

An assembly of gilled or finned water tubes in which each tube and its fins form a separate or individual unit, the units being joined at header plates only. The tubes may be of any transverse section, but are not of the thin, flat type in which the width is equal to the depth of the core. The fins may be flat or crimped and may be applied as separate disks of any shape or as helical strips.

2. *Continuous Fin and Tube Type*

An assembly of finned water tubes in which the tubes pass through fins or plates which are continuous between (or common to) two or more tubes. The tubes may be of any transverse section, but are not of the thin, flat type in which the width is equal to the depth of the core.

3. *Ribbon Cellular Type*

An assembly of water tubes formed by joining metal ribbons at the edges, the walls of the tubes usually being crimped and the tubes so grouped as to form a cellular structure. Parts of the cellular structure are sometimes formed by flat or crimped ribbon, which is not a part of the walls of the tube.

4. *Air Tube Cellular Type*

An assembly of air tubes nested in such a way as to form water passages between the tubes, the passages being sealed at the end of the tubes. In this type the water can flow transversely as well as vertically around the tubes.

portance than are those referring to the definitions bearing the numbers 1 and 2 respectively in the same columns. The words "water tube" have been substituted for "water passage" and the words "an assembly" for the words "a number."

It should, of course, be understood that the foregoing comments are intended entirely as constructive criticism of the work of the Radiator Division of the S. A. E. Standards Committee and should not be construed in any other light.

Rotating Indexing Jigs Reduce Labor Cost in Engine Manufacture

One man operates three to five machines in production of G. M. C. truck engine. Bores for cylinder sleeve are turned before ends of block are milled off. Close tolerances held throughout process. Crank and camshaft bearings are line reamed with motor drill.

By J. Edward Schipper

BY the consistent use of rotating indexing jigs in the manufacture of the General Motors truck engine, it has been possible to reduce materially the number of men needed to turn out a given production. These double jigs allow one side of the tool to be loaded while the other is cutting. At the completion of an operation it is necessary only to swing or rotate the loaded half of the jig into position. Consistent use of this method has made it possible to use one man for three or five machines in place of one man per machine. Furthermore, the intervals between cuts are kept extremely short.

The method is particularly effective and economical where production is not always up to capacity. When production is running low, one man can operate an extraordinary number of machines because of his ability to charge the jigs while the machines are cutting.

The design of the General Motors truck engine, of course, has a considerable effect on the methods employed in its manufacture. This engine differs from other truck engines in that the cylinder barrel is a detachable sleeve manufactured separately from the block itself and inserted afterward. The engine is a wet-sleeve type, the water being in direct contact with the outside of the sleeve and the inside forming the cylinder bore. Because of the separate manufacture of this sleeve, practically all of the usual operations on cylinder block barrels are eliminated.

After being checked for quality and for the distribution of metal, the rough cylinder castings are slabbed off on the top and bottom on an Ingersoll miller. This is a straight, table type machine with rough and finish cutters. It carries six blocks to the table. The casting is located on stops or lugs cast on the block for the purpose. The block is an unusually simple casting.

Bottom Flange Drilled in One Operation

The bottom flange of the casting is drilled on a Natco multi-spindle drill, thirty-six holes being cut in one operation. The drilling is located from the same stops as were used for the initial milling operations. A double jig is used on this machine, permitting loading during the operations. Following the drilling of the bottom flange, two holes in diagonally opposite corners of the casting in the bottom flange are accurately determined for locating the subsequent operations. One of the holes is first hand reamed. A jig plate is then put on and the other diagonal hole is hand reamed. These dowel holes are used for locating practically every other operation in the manufacture of the block. Three oil holes are next drilled in the oil

passages which are cast in the block. These holes are drilled simultaneously on a Leland-Gifford machine.

The holes which require tapping are chamfered before the tapping operation, so that no burrs are thrown up on the surface of the metal. The machine taps are .006 in. under size. Following the machine tapping, the holes are hand tapped to actual size. This particularly applies to the stud holes for the main bearing caps and for the cylinder head. The main bearing studs are put in and the main bearing caps are dropped into place after a 1/16 in. shim for temporary fitting has been inserted. The stud nuts are machine tightened.

Water Holes Formerly Cast Now Drilled

A Natco drill fitted with a double jig is employed to put the forty-seven holes in the head simultaneously. The holes drilled in the head include the water holes. These were formerly cast in place, but it was found that drilling gave a more positive location and a better gasket contact.

One of the unusual steps in the manufacture of this block is that the bores for the cylinder sleeve are turned before the ends of the block are milled off. Boring is accomplished by a battery of five Defiance single-purpose machines operated by one man. Forty-eight operations are taken care of by these five machines. Rough and finish boring operations are completed on the blocks and the valve openings; the valve guides are bored and line reamed, and the valve seats are cut.

The entire battery of five machines is arranged so that the blocks are passed from one to another without any lifting whatever. A roller conveyor travels the entire length of the battery. This conveyor is continuous when the machine is opened for loading and drops below the table out of the way when the machine is closed to begin its work. At the completion of an operation, the machine automatically cuts off. The operator then opens the machine and slides the blocks along the roller conveyor into the next machine for the subsequent operations.

There is a counter-boring operation on the valve seat at an angle to the center line of the cylinders and a counter-bore on the blocks for the cylinder sleeve flange. The depth of counter-bore for the sleeve is checked by a go and no-go gage and held to a limit of .002 in. Then follows the machining of the recess for the lower cylinder sleeve gasket which is checked by an ingenious expanding gage to limits of .004 in. on its diameter.

The next series of operations is a very good example of rotating, indexing jig work. The horizontal boring opera-

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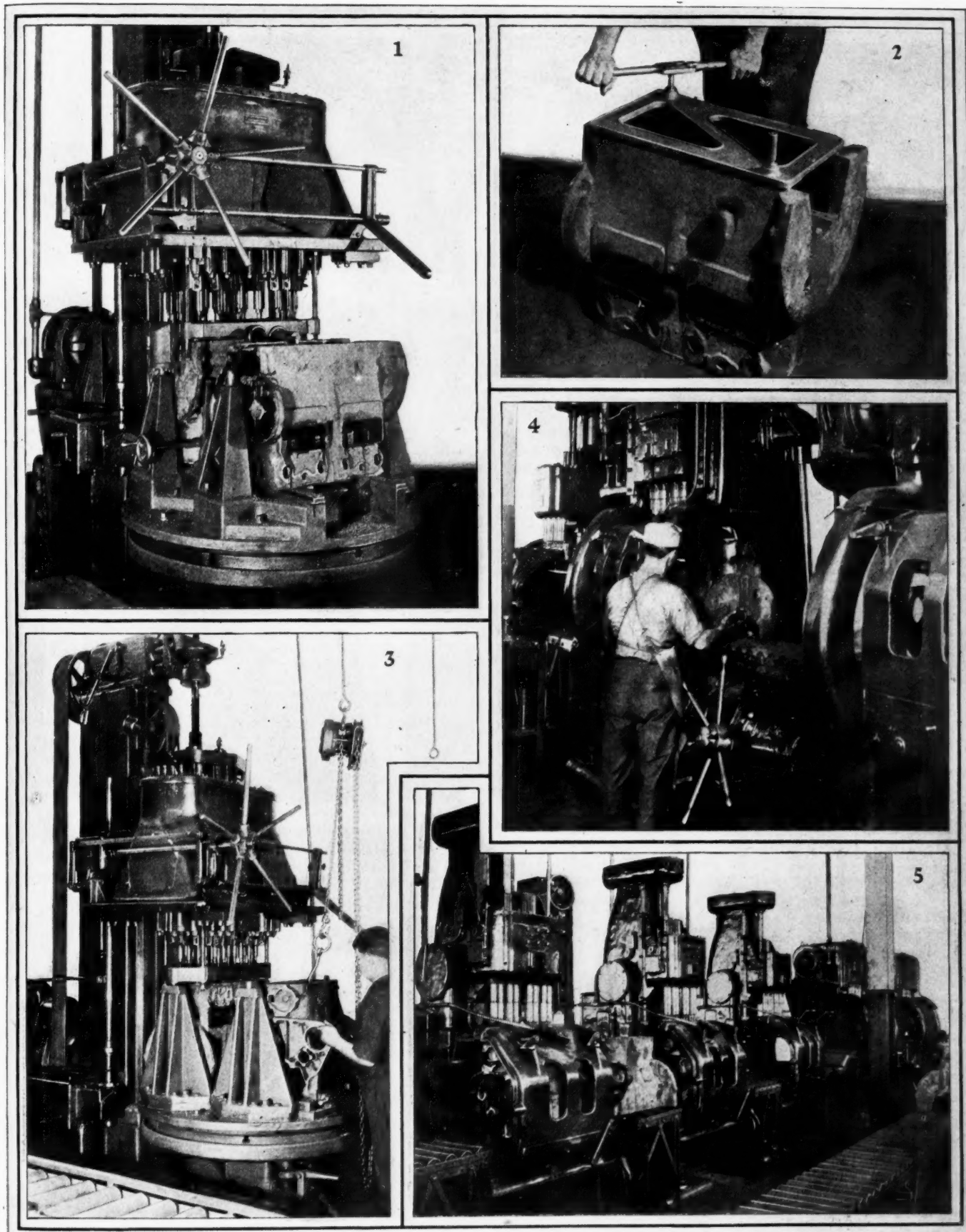
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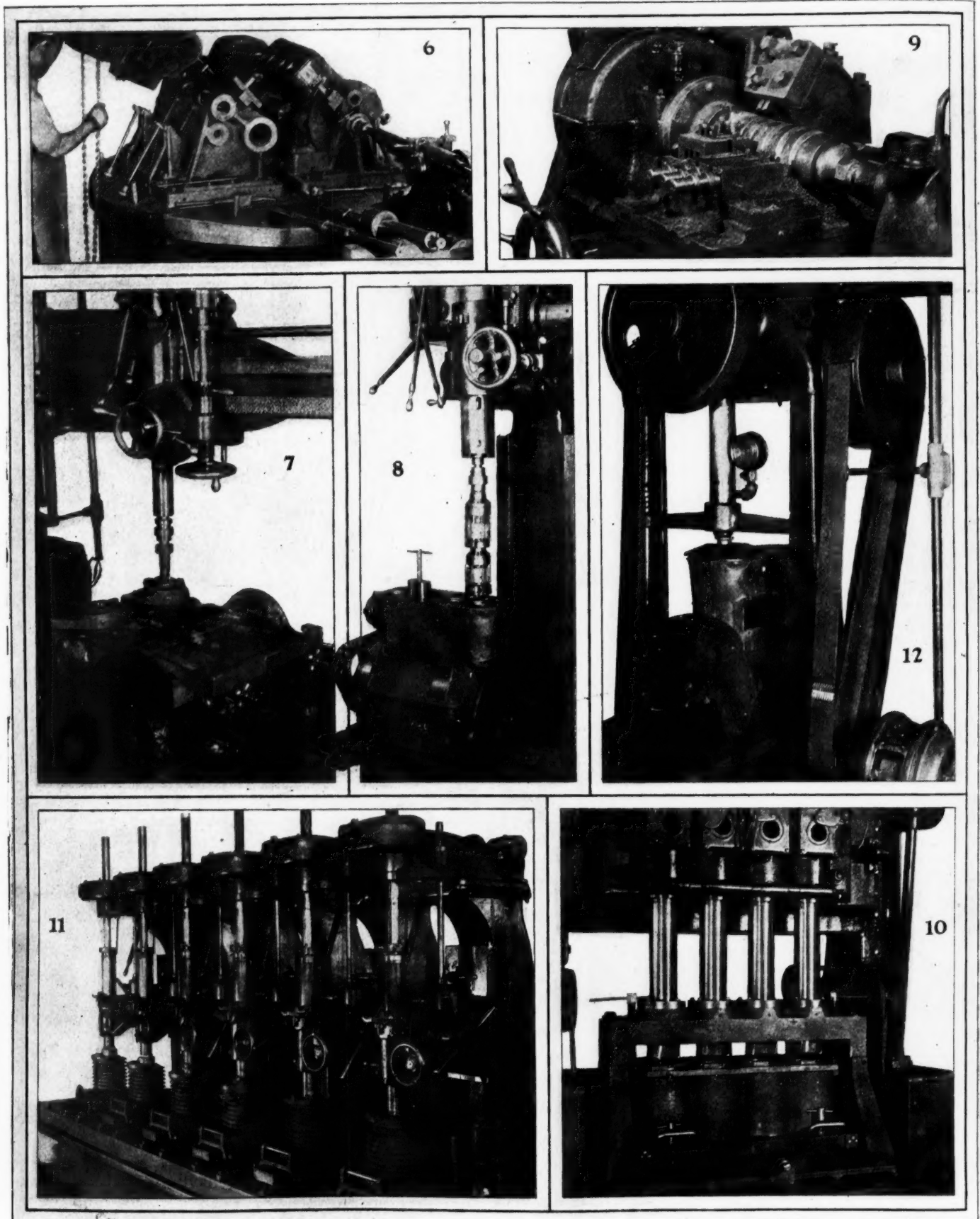
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1—Drilling bottom flange of General Motors truck engine block casting on Natco multiple spindle drill. Thirty-six holes are drilled simultaneously. Note the double, rotating fixture for loading while machine is running. 2—Locating and hand reaming diagonally opposite holes for location of subsequent operations. 3—After the locating holes are put in, the block is turned over and drilled on a multi-spindle Natco on the top flange. 4—Cylinder block passing through one of the boring operations in the battery of five Defiance machines. 5—Line-up of the battery of five Defiance machines which take care of forty-eight boring, reaming and similar operations



6—Horizontally boring the main and camshaft bearing and milling the magneto mounting seat. A double jig is utilized here. 7—Mueller radial used for boring and reaming the intake manifold. 8—Simultaneously reaming top and bottom holes for the sleeve with a compound reamer. 9—Initial turning operation on the outside of the sleeves. 10—Rough boring the inside diameter of the sleeves on a Foote-Burt machine. All four are rough bored simultaneously. 11—In finish boring the sleeve, they are held in ribbed pots to radiate the heat and consequently maintain uniformity. 12—Pressing the sleeves into the cylinder blocks, two at a time

tions on the crank, cam and generator shaft bearings are performed simultaneously. There are three bars on this machine, two coming in from one direction and one from the other. The boring bars for the main and camshaft bearings each have four piloting supports. The same bar that carries the boring cutter for the generator bearing also carries a milling cutter for the cylindrical seat for the magneto bracket. There are two identical Rockford machines for this work, the first taking a heavy, rough cut and the second a light, finishing cut. Location for the work is from the pads used to locate the initial milling operation on the block and from the two diagonal dowel holes.

The crank and camshaft bearings are line reamed with a motor drill and a universal, self-centering attachment. The bridge for the center main bearing is then straddle milled. Both ends and the manifold side of the casting are then simultaneously milled. By using bars or mandrels through the main bearings to locate this operation, it is certain that the ends of the block will be square with the crankshaft. An Ingersoll miller taking both a rough and finish cut is employed for this operation. There are six cutters on the rough side and four on the finish side. Two cutters on each side for the roughing cut being displaced by single, large cutters on the finish cut side account for the difference in the number of cutters for the two operations. In milling off both ends and the manifold side, a total of eleven faces is simultaneously machined. The manifold side is drilled on a Natco drill with an indexing, rotating fixture. The intake manifold is bored and reamed, a thimble first being put in the fixture for accuracy, on a Mueller radial.

Sleeve Holes Reamed Simultaneously

There are a number of small boring, drilling and tapping operations which follow, including the hole for the oil pump driveshaft, drilled on an angle, the holes for the manifold studs which are also tapped and the oil drain hole also drilled on an angle. All the holes in the front end are simultaneously drilled on a Natco. A separate drilling operation on the front end is used for the timing gear cover dowel holes.

The top and bottom holes for the sleeves are reamed simultaneously. These holes are held within .001 in. limit on a segmental go and no-go gage. The blocks are then put through a pressure test on the oil system, first to locate any possible leaks, and second, to make certain that the oil will flow through all the proper passages. This is the final operation on the block itself.

The sleeves are manufactured in a separate department. They come in as rough, hollow, cylindrical castings. The first operation is to cut off and chamfer both ends. They are then located in a Fay automatic and rough turned outside. The principle of loading while the machine is running is followed in the manufacture of the sleeve. One of the sleeves is mounted on an arbor while the other is running through the Fay automatic, and as soon as the automatic shuts off, the operator is ready to insert the next loaded arbor with its sleeve.

By alternately taking the skin off the castings, first on the outside and then on the inside, internal strains are relieved and the customary aging has been done away with. The Fay automatic for machining the outside of the sleeve carries six tools in front and two in the rear. By the use of the greater number of tools, a shorter feed is necessary and, consequently, the time required for this operation is reduced.

Following the cutting of the outside of the sleeve, the inside is rough bored on a Foote-Burt machine, ears having been left on the casting to act as drivers for this operation. The sleeves are then finish chamfered and

finish turned on a Fay automatic with eleven cutting tools. Following the finish turn on the outside of the sleeve, a secondary boring is given in another Foote-Burt machine. Compressed air chucks are used on the sleeves so that there is no distortion by reason of uneven chucking. The uniformity of chucking tends to keep the products uniform, which would be impossible with a screw type of chuck where the pressure would vary.

Final Operations on Cylinder Sleeves

Following the finish turn, there is a rough grind on the outside, this being accomplished on a Landis grinder. The finish bore is then given following the practice of alternating the cut, first on the outside and then on the inside. The cylindrical sleeves are held in ribbed pots to radiate the heat during the finish boring operation and they are held within .001 in. variation. After the finish bore, the driving ears on the casting are sawed off, the flange at the top of the sleeve is finish turned and a taper is turned on the bottom end of the sleeve. A finish grind is given the external diameters at both top and bottom fits in which the limit of variation is held to .0005 in. At this time, the wall thickness of the sleeve is 7/32 in.

In assembling the sleeves into the blocks, they are first hammered in place to an approximate seat and then put in a press with a fitting which leaves the sleeve .010 in. above the block. After the sleeves are in place the water jackets are tested under city pressure, which averages about 30 lb. to the sq. in. No difficulty is experienced with leaks around the wet sleeve. The rubber gasket which is inserted in the groove into which the tapered lower end of the sleeve is driven is grooved. The driving in of the tapered lower end of the sleeve tends to expand the gasket in these grooves, forming a firm seat. There is a gasket also at the top in the counter-bore under the sleeve flange.

After assembly, the sleeves are again checked with go and no-go gages to make certain that in assembly there has been no distortion. The slightest distortion of the sleeve would be immediately detected by this means, as the gages indicate a tolerance of .0005 in. After this inspection, the blocks are passed along to the assembly department.

Progress in Standardization Work

A RECENT conference held in New York City under the auspices of the American Engineering Standards Committee revealed a sentiment among engineers, scientists, government officials, business paper editors, and industrial executives, emphatically in favor of the unification of technical and scientific abbreviations and symbols.

The conference was called to consider abbreviations and symbols, but after some discussion of the subject it was thought desirable to include as a part of the project, the graphical symbols which are used in engineering drawings, diagrams, and the like, for representing instruments and apparatus and components of them.

It was agreed that the cooperation of foreign standardizing bodies should be sought, in the development of the work. The importance of international uniformity in symbols is great on account of the international character of much engineering and scientific work, and the importance of reference books and periodicals in foreign languages.

The work will go forward under a committee organization developed in accordance with the rules and procedure of the American Engineering Standards Committee. Representatives of 29 different organizations attended the conference, manifesting the diversity of interest involved in the project.

Domestic Gasoline Shows Slight Gain in Volatility

Bureau of Mines seventh semi-annual survey reveals tendency toward greater uniformity in character of the fuel sold throughout the country. Less seasonal variation in volatility.

CONTRARY to common belief the volatility of gasoline sold in the United States has improved slightly in the past year. This year the average boiling point remains practically the same as last year, but a slight gain is indicated by better volatility at the higher boiling points. This is the finding of the seventh semi-annual survey carried out by the Bureau of Mines.

Another important fact brought out in the report of the survey is that there is a tendency toward greater uniformity in the character of gasoline sold throughout the United States. The following table shows this tendency as indicated by figures obtained in the seven semi-annual surveys. These figures were obtained by averaging the end points of 10 per cent of the least volatile samples and 10 per cent of the most volatile samples. The averages are represented in the table as the "Maximum 10 per cent" and "Minimum 10 per cent" respectively. The "Differences" show the decreasing range of end points and hence the tendency toward uniformity.

Decreased Range of End Points

| | Jan. 1920 | July 1920 | Jan. 1921 | July 1921 | Jan. 1922 | July 1922 | Jan. 1923 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Maximum 10 per cent... | 482 | 502 | 467 | 473 | 461 | 461 | 451 |
| Minimum 10 per cent.... | 377 | 406 | 382 | 398 | 397 | 401 | 397 |
| Difference | 105 | 96 | 85 | 75 | 64 | 60 | 54 |

Some years ago "summer quality" gasoline was much less volatile than "winter quality" but of recent years there has been less and less difference between the volatility of gasoline sold at different seasons. This year the difference is found to have decreased even more.

Ten cities were included in the survey and samples of gasoline were taken and compared with samples taken a year ago. In comparison with January, 1922, the average for Washington shows an increase of 20 deg. in the initial boiling point and a decrease of 12 deg. in the 90 per cent point. Averages for Pittsburgh, Chicago and St. Louis show a consistent drop throughout the distillation range with the exception of the initial boiling point which increased slightly. Decrease in volatility is indicated by the averages for Salt Lake City and San Francisco. An 11 deg. rise was noted in the average 90 per cent point and end point in samples from San Francisco and the same points of the samples from Salt Lake City rose 8 deg. and 2 deg. respectively.

Of 129 samples collected for the survey, 56 failed to meet Federal specifications as laid down October 31, 1922. Their points of failure are as follows: Five failed at initial point, 7 failed at the 20 per cent point, 20 at the 50 per cent point, 28 at the 90 per cent point, 24 at the end point and 20 samples failed in the amount recovered from the distillation. New York City is the only one of the 10 cities surveyed in which all samples met specifications.

Samples from the 10 cities were analyzed in accordance

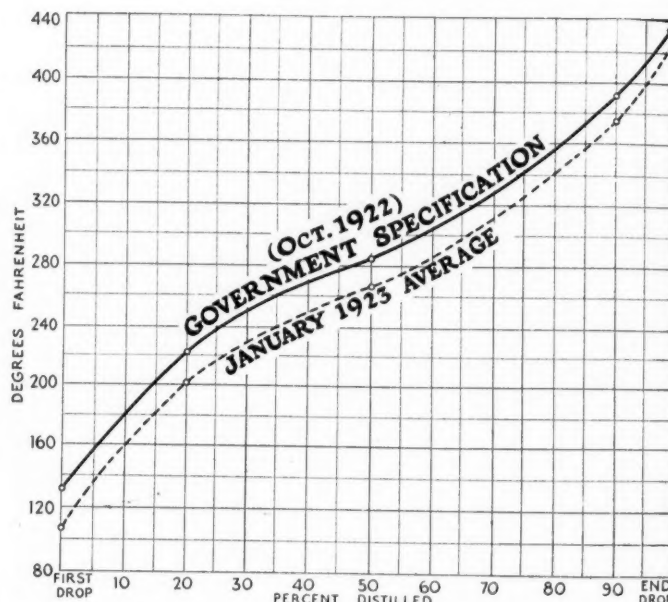


Chart showing how the average distillation curve of gasoline sold throughout the country compares with Government Specifications for this fuel

with the methods given in the Bureau of Mines Technical Paper 214 entitled, "Motor Gasoline; Properties, Laboratory Methods of Testing and Practical Specifications," by E. W. Dean. The actual specific gravity at 60 deg. Fahr., the corresponding degrees A. P. I., the initial boiling point or first drop, the 20, 50 and 90 per cent points, the end point, the average boiling point and the per cent recovered in the receiver were determined for each sample and averaged as follows:

Average Results of Motor Gasoline Survey January, 1923

| District | Specific gravity | A. P. I. degrees | First drop | 20% | 50% | 90% | End point | Ave. B. P. | Per cent recovered |
|--|------------------|------------------|------------|-----|-----|-----|-----------|------------|--------------------|
| New York City.... | 0.739 | 60.0 | 101 | 201 | 270 | 368 | 420 | 267 | 96.3 |
| Washington, D. C. | 0.758 | 55.3 | 118 | 202 | 261 | 368 | 424 | 267 | 96.8 |
| Pittsburgh, Pa.... | 0.729 | 63.0 | 95 | 171 | 244 | 382 | 423 | 249 | 92.8 |
| Chicago, Ill..... | 0.745 | 58.4 | 107 | 202 | 268 | 379 | 433 | 271 | 96.5 |
| New Orleans, La.. | 0.743 | 58.9 | 117 | 213 | 280 | 376 | 428 | 278 | 96.9 |
| St. Louis, Mo.... | 0.736 | 60.8 | 103 | 196 | 269 | 382 | 433 | 268 | 95.4 |
| Bartlesville, Okla. | 0.742 | 59.3 | 109 | 205 | 273 | 381 | 440* | 274 | 96.4 |
| Denver, Colo..... | 0.744 | 58.6 | 109 | 205 | 273 | 369 | 419 | 270 | 96.5 |
| Salt Lake City, Utah | 0.742 | 59.4 | 98 | 199 | 265 | 370 | 414 | 264 | 95.7 |
| San Francisco, Cal. | 0.759 | 54.9 | 113 | 207 | 265 | 370 | 432 | 269 | 97.3 |
| Average for 10 cities (1923).... | 0.744 | 58.8 | 107 | 201 | 267 | 375 | 427 | 268 | 96.0 |
| Average for 9 cities included in Jan. 1922 survey..... | 0.745 | 58.0 | 102 | 200 | 267 | 377 | 430 | 268 | 96.0 |

*Failed to meet specifications for Federal purchases adopted Feb. 3, 1922 and revised Oct. 31, 1922.

Latest Stanley Chassis Incorporates Numerous Refinements

Boiler capacity increased about 50 per cent. More powerful brakes are also fitted. Water fed to boiler and fuel to burner are controlled automatically. Generator supplies current for lighting and for vaporizing fuel in starting.

By P. M. Heldt

AMONG the few American cars of today that have behind them a record of nearly a quarter century of continuous production, is the Stanley, the only steam passenger car manufactured in considerable numbers in any country. Like most other car manufacturers, the Stanley Motor Carriage Co. has long since given up the policy of bringing out a new model every year, but improvements are embodied in the design at intervals, and in the course of several years they mount up and make a considerable difference in the appearance and operation of the car. Since no technical description of the Stanley has appeared in *AUTOMOTIVE INDUSTRIES* since 1917, our readers will be interested in a presentation of the latest design.

The Stanley is made in only one chassis model, of 130 in. wheelbase, and with 32 by 4½ in. tires, which figures may serve to give a general idea of the size of the car.

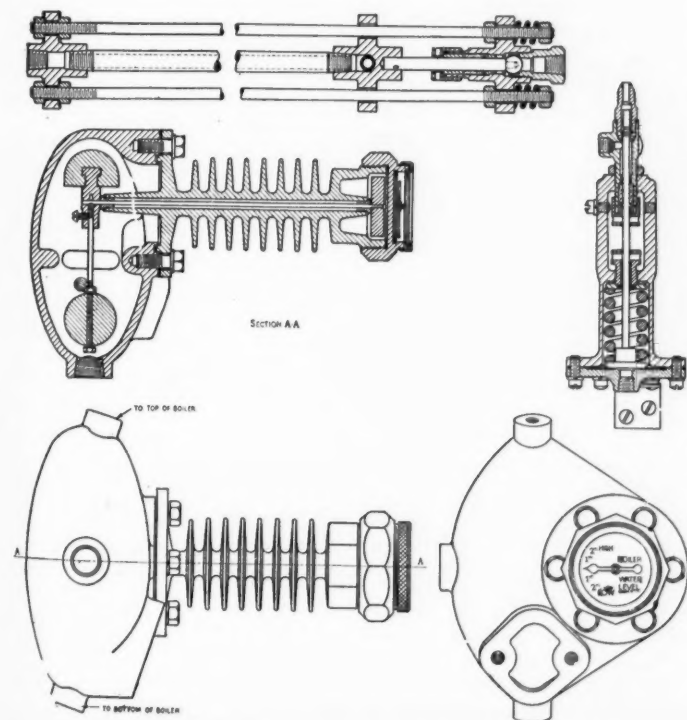
It is furnished with three types of open body, a roadster, and 5 and 7 passenger phaeton, and also with two types of closed body, both sedans, with seating accommodations for five and seven passengers, respectively. The prices of these cars range from \$2,750 for the runabout to \$3,985 for the seven passenger sedan.

Increased Boiler Capacity

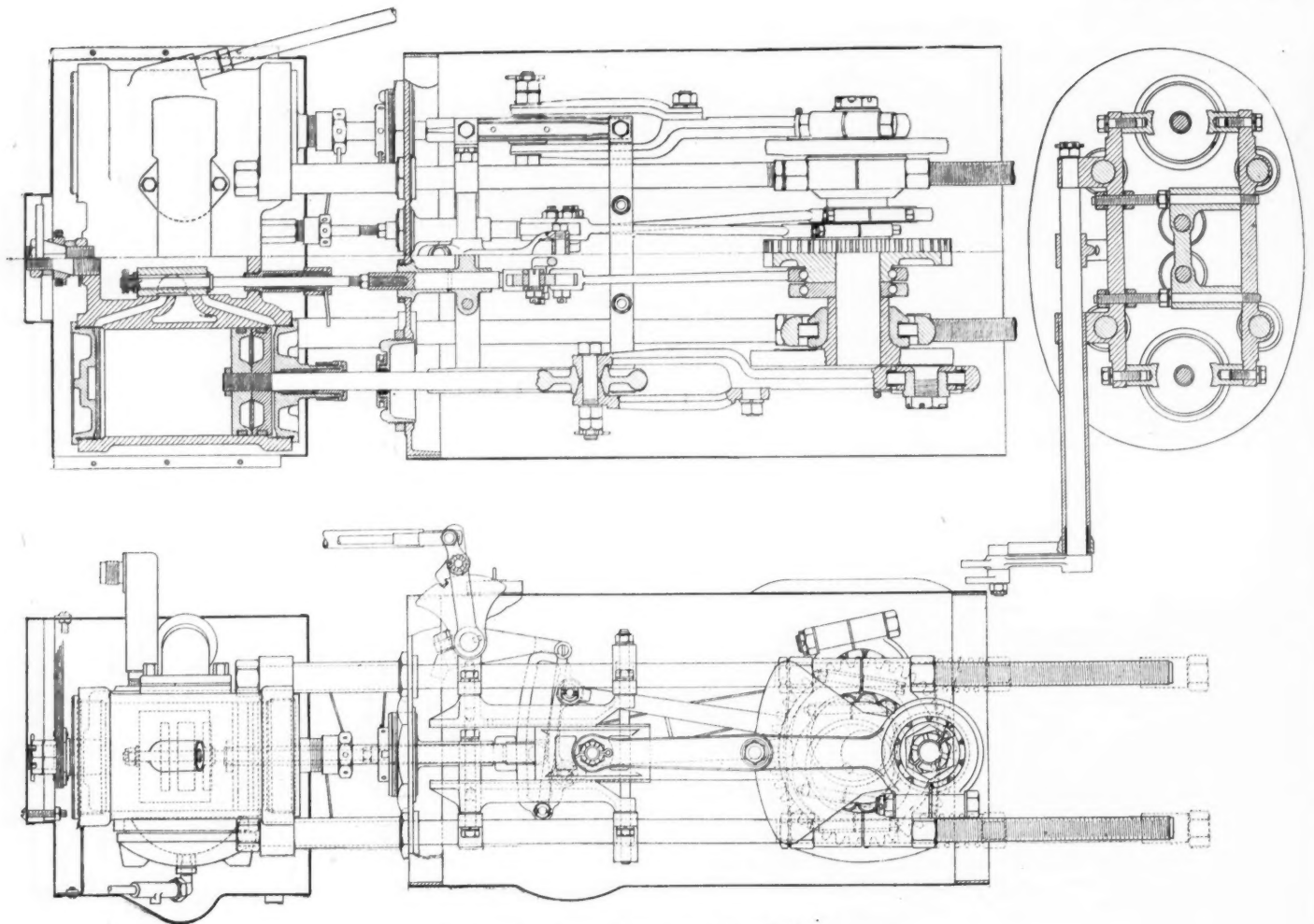
The boiler, which is the source of power in a steam-propelled automobile, and which generally determines the maximum continuous output of its power plant, is of the fire tube type, drum shape, and stands on end, and through it run 640 half-inch tubes. The boiler is 23 in. in diameter by 18 in. high. The height has been increased from 14 in., and as the steam space remains the same, the water-wetted heating surface is greater by about 50 per cent and the heat storage capacity by the same. In connection with heat storage capacity it is of interest to state that when the boiler is under full pressure and the fuel is then shut off from the burner, the car can be driven for several miles over good roads on the energy stored in the boiler, the pressure, of course, gradually decreasing. The boiler has a total capacity of 23 gal. and at the normal water level the water content is 16 gal. as compared with 11 gal. previously. The boiler shell is of comparatively thin stock, the strength necessary to withstand the steam pressure being provided by a winding of three layers of piano wire. This construction permits a light boiler. Over this wire is applied a lagging of magnesia asbestos which serves as a heat insulator. Formerly a plain sheet asbestos lagging was employed, and a considerable improvement was effected when the asbestos-magnesia compound was substituted. The shell and lower sheet are in unit, and the upper sheet is welded in. The tubes are welded into the bottom tube sheet after a preliminary expanding operation, and are expanded into threaded holes in the top sheet.

The dome over the boiler is also much better insulated than it was formerly, having a 1¼ in. asbestos and magnesia covering on top and sides. There is a flap on top of the dome which is opened by raising it when the burner is to be started from cold.

The water supply is carried in a copper tank of 24 gal. capacity located under the front seat, and forming the lowest part of the system, so that the water of condensation from the condenser at the front of the car naturally drains back to it. An incidental advantage of having the tank lower than the condenser is that it can be filled



At top, feed water regulator; below, three views of water level indicator; at right, steam pressure regulator



Sectional views of the Stanley steam engine

through the condenser filler opening, which is just like the radiator filler opening in a gas car. The tank has flat surfaces, which makes it immune to injury from freezing, while the front and rear surfaces are slanted, partly to reduce air resistance and partly to give the hot gases from the burner, which are directed against the forward surface, a chance to sweep the bottom surface as well, and thus assist in keeping the contents of the tank warm in cold weather. The tank is supported on the chassis frame by steel straps. A water tank gage extends up through the footboard into a position where it can be conveniently read. An overflow from the tank discharges at the rear of the car. The boiler feed pump draws from a pocket in the bottom of the tank and the tank is drained at the same point.

Plunger Pump Feeds Boiler

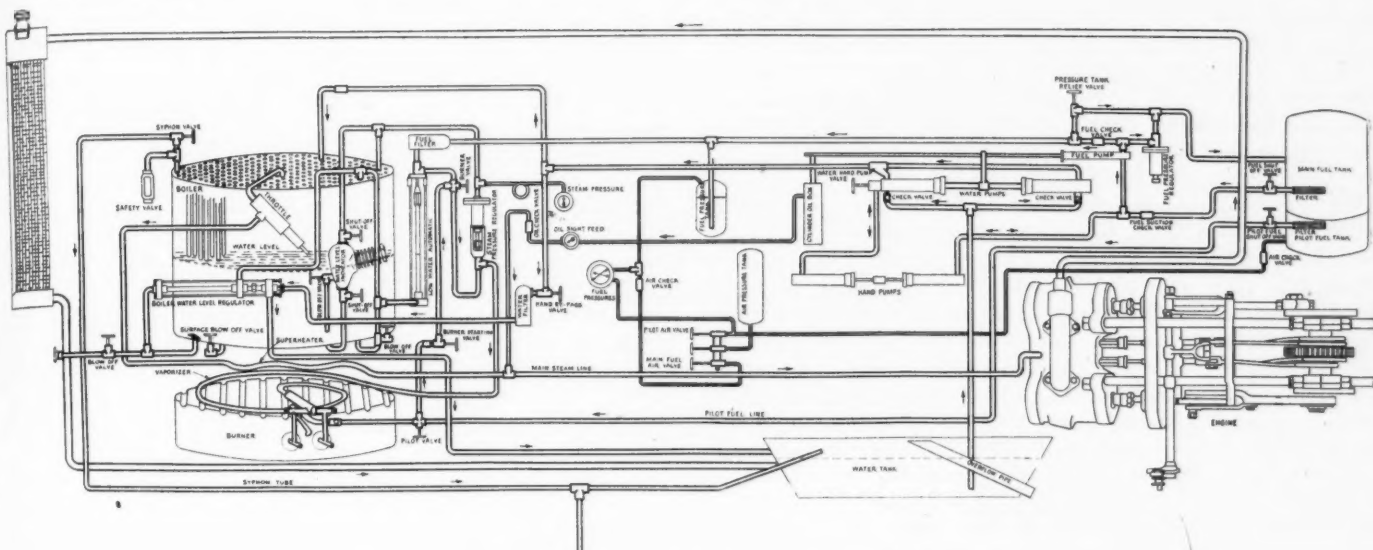
Notwithstanding the fact that all of the exhaust steam is discharged into the condenser, some water is continuously lost, and the water supply must be renewed at intervals. The length of these intervals, expressed in miles running, depends, of course, to a large extent upon the atmospheric temperatures, and also upon the character of the route. Under normal conditions, one filling of the tank will last for from 150 to 250 miles.

Boiler feed is accomplished by one double-headed plunger pump, the object being to secure a more nearly constant stream of water. This pump is operated through a long pump rod from a crank and gear mechanism on the rear axle, at one-quarter engine speed, and is located in the pump box, which is alongside the water tank, on the right hand side, and is illuminated by an electric lamp

when occasion requires. The rod connects to a crosshead which serves for both the water pump and the fuel pump, these two pumps being located side by side in the pump box. In addition to the power water pump there is a hand pump for emergency use, which is located under the front floorboards. One of the uses of this hand pump is to fill the boiler in the first place in case no pressure water system is available. The capacity of the power water pump is more than adequate to meet the requirements of the boiler under the most severe conditions. The pump, of course, operates continuously, and any excess of water pumped is by-passed back to the tank.

The water in the boiler is automatically maintained at a substantially constant level by means of the boiler feed-water regulator, which is located to the right of the boiler. This regulator consists of a horizontal brass expansion tube connected to the boiler at top and bottom. The tube itself lies at the level at which it is desired to maintain the water in the boiler, and when this drops below the normal, the tube will fill with steam and expand, and this will cause the by-pass valve to close. Of course, in the boiler, water and steam are at the same temperature, and it may therefore not be immediately obvious why the replacement of water by steam in the brass tube should have the effect described; the explanation is that in the tube the contact surface between the water and steam is so small, compared with the amount of water contained, and the water can cool off so rapidly that this equality of temperature is not maintained there.

As will be seen from the sectional view of the water regulator herewith, one end of the brass expansion tube is fastened in a casting from which connection is made to



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diaphragm overcomes the pressure of the spring, when the valve will open and the fuel pumped will return to the main tank. The pressure normally maintained in the fuel pressure tank is 120 lb. per sq.in. From the fuel pressure tank the fuel passes through a fuel strainer on the front of the dash and past the low water fuel shut-off valve and the boiler pressure regulator to the main burner.

The first named is incorporated in the system at this point to guard against low water in the boiler. When the fuel level drops to within 3 in. of the bottom sheet, a thermostatically controlled valve on the forward side of the dashboard shuts off the fuel supply to the main burner. This thermostat is of the same general type as that used for regulating the water level in the boiler. It can be tested by opening a hand valve near the top of the brass column, letting hot water into the thermostat, which should immediately result in shutting off the fuel from the main burner. From this low water fuel shut-off valve the fuel passes to the hand valve on the dash. Next in the fuel line comes the boiler pressure regulator from which a branch leads to the steam gage on the dash.

Operation of Boiler Pressure Regulator

The boiler pressure regulator acting on the main fuel line is of the same general type as the main fuel pressure regulator. A sectional view of it is shown herewith. The diaphragm valve closes when the boiler pressure attains such a value that its effect on the diaphragm is greater than that of the coil spring, whereupon the valve closes and no fuel can flow to the main burner. As soon as the boiler pressure drops below the predetermined value, the spring overcomes the pressure on the diaphragm, the valve opens, and the burner is again supplied with fuel. From this regulator the fuel passes directly to the burner. The pressure regulating valve is set to act at 500 lb. per sq.in., and steam is normally carried at that pressure.

The gasoline in the rear tank is maintained under a pressure of from 10 to 20 lb., which is derived from a seven-gallon air storage tank under the front seat, carrying air under 150 lb. pressure. This tank is refilled from garage air tanks, and the air is allowed to flow from it to the fuel tank through a hand-controlled valve. Before entering the burner, the fuel passes through a vaporizer which consists of two spiral convolutions of steel tube directly over the main plate of the burner. There is a four-foot length of steel cable in this vaporizer at the end where the fuel enters, which is removed and cleaned from time to time. In normal operation the main burner is turned on and off by the pressure regulator in accordance with the power requirements.

Inclosed within the main burner and set into a recess of it is the pilot burner. The pilot burns continuously when the car is in use, whether going or standing. It is usually kept burning over night or for other long periods. It will go three days or more without attention, whereupon it will require fuel. The functions of the pilot are three. It maintains steam pressure on the boiler, and keeps the fuel system hot, thus assuring a quick start and immediate combustion after standing over night or for other long intervals; and it ignites the main burner fuel as it is turned on, either by hand or automatically by the boiler pressure regulator when the car is running, and it protects the car against freezing when at rest in cold weather.

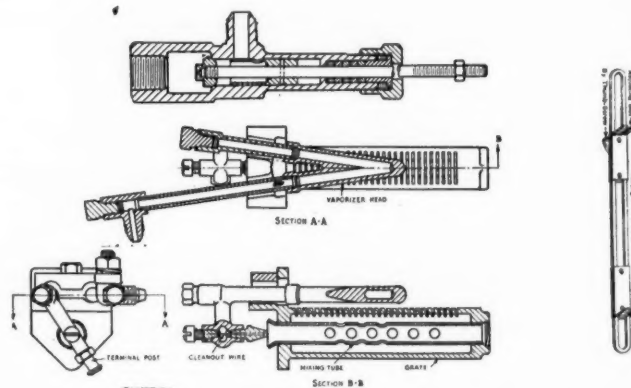
The pilot burner is of the Bunsen type, and consists of a casting with a series of slots in its top; the pilot vaporizer, placed over this casting, and consisting of a small V-shaped tube through which the fuel passes to be turned into vapor; and the mixing tube into which the vaporized fuel is injected through the pilot nozzle and from which, mixed with air, it passes up through the slots in the casting for combustion. The injection takes place

under the pressure maintained in the pilot fuel tank; and the intensity of the pilot can be varied by means of the pressure on this tank, which is adjusted in such a manner so as to maintain constant steam pressure in the boiler when the car is standing.

Within the pilot nozzle there is a screw with a wire extension, which latter passes entirely through the nozzle and fills all space in the nozzle, except that left where the wire is filed down flat on top, thus forming a passage of the right size for the fuel. The object of the screw and wire is to permit of easily cleaning the nozzle in case carbon deposits should form and partly obstruct it. The screw is then removed and the nozzle "blown out" with the fuel pressure. For cases where carbon deposits have formed that cannot be dislodged by the blast, a drill of the size of the nozzle bore is furnished as part of the equipment of the car.

Gasoline is used as fuel for the pilot burner, and on account of its higher volatility, vaporizes comparatively easily, but for starting the pilot in cold weather an electric heating coil is placed inside the connection between the pilot vaporizer and nozzle, through which a heavy current from the storage battery can be sent to heat up the gasoline on its passage to the nozzle. On the left frame member at the side of the hood there is an electric heater connection which is slipped over the terminal of the pilot vaporizer, and a starting button—similar to the starting switch of gasoline cars—is then pressed down for about 10 seconds. This imparts enough heat to vaporizer so that the fuel passing through it will vaporize readily when leaving the nozzle. Ignition of the pilot burner is effected by means of ordinary sparking gas lighter.

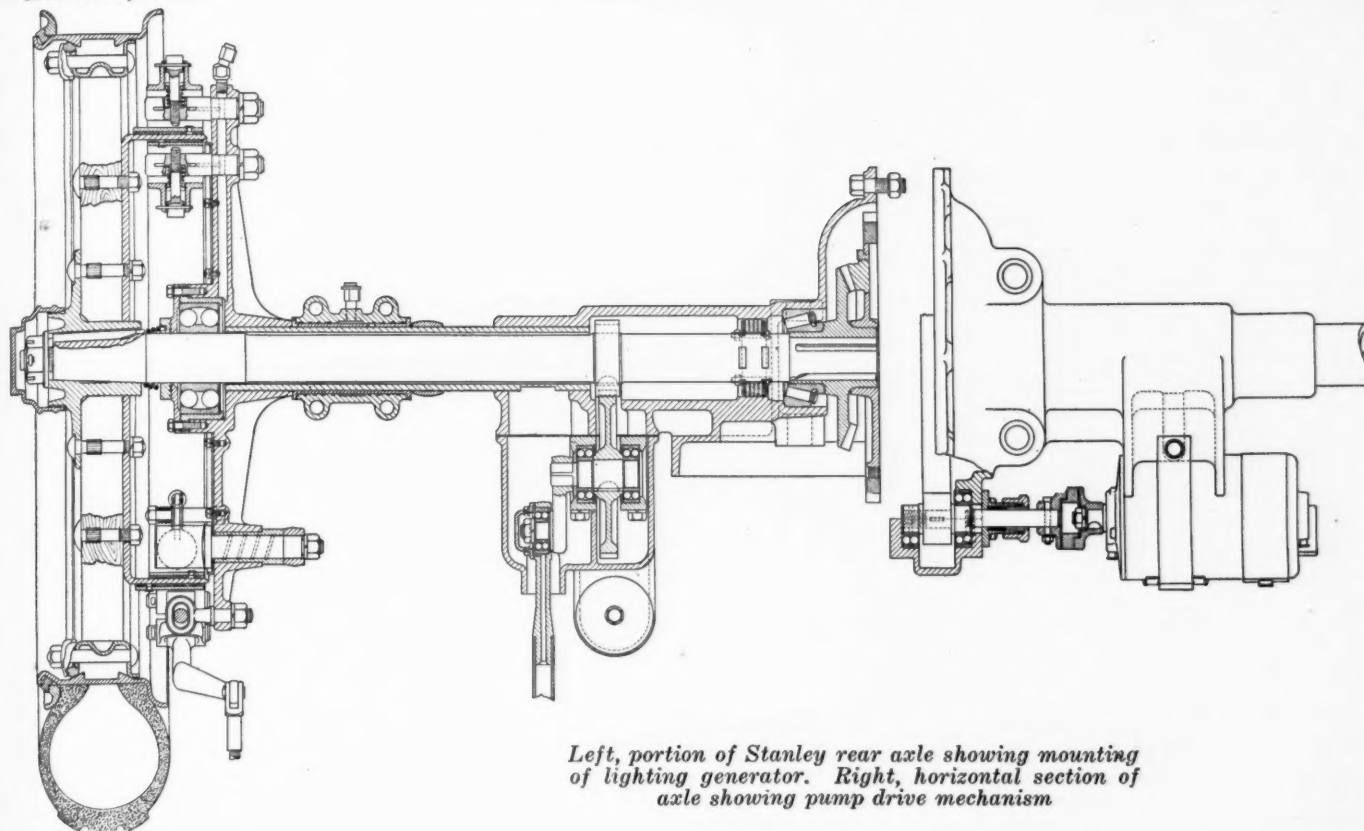
The main burner is of the Bunsen type, the same as the pilot burner. The fuel is forced from two nozzles under the air pressure of about 120 lb. per sq.in. in the fuel pressure tank. The nozzles discharge into two mixing tubes, the fuel drawing with it sufficient air for its combustion. From the mixing tubes the mixture passes into the burner casting, the top plate of which is corrugated



Top, throttle valve; below, pilot and vaporizer

and has a large number of slots in the crests of the corrugations, through which the fuel mixture passes into the combustion chamber, where it is burned. The combustion chamber is lined with heat-resisting metal, between which and the outer shell there is a packing of asbestos and magnesia. For starting when the car is cold, gasoline can be admitted to the main burner from the pilot fuel tank by means of a hand valve under the instrument board. Using a small quantity of the more volatile gasoline first will accelerate starting the main burner.

The throttle is located directly on the boiler to prevent condensation. It is operated by the throttle lever, which is mounted on a sector below the steering wheel and con-



Left, portion of Stanley rear axle showing mounting of lighting generator. Right, horizontal section of axle showing pump drive mechanism

veniently shaped for operation by the index or middle finger, while the palm of the hand rests on the steering wheel. The throttle valve is of the safety type, commonly used in steam practice. That is, it opens against the boiler pressure, so that in case the connecting linkage should come apart accidentally the valve will close automatically and the car will come to a stop.

A number of improvements have been made recently in the throttle valve, among them being means to insure more gradual opening, which tends to prevent some drivers from taking advantage of the storage of power in the boiler for abusive starts. The throttle permits of sufficient variation of power at the driving wheel to meet all requirements of road and travel without the use of change gear.

A superheater, consisting of a length of $\frac{3}{4}$ in. heat-resisting tubing passing through the full heat of the burner directly under the boiler, receives the steam as it comes from the throttle valve.

The engine of the Stanley is a two-cylinder double-acting type of 4 in. bore and 5 in. stroke, arranged horizontally at the rear of the frame and geared directly to the rear axle by spur gearing. At the forward end the engine is suspended from the frame in a way to be described in detail farther on, that allows the engine to act also as a torque member, while at the same time permitting free action of the springs. As the greater portion of the weight of the engine resides in the cylinders, and is, therefore, near the suspended end, the engine has the benefit of spring suspension, and the unsprung weight is only slightly added to by gearing it to the rear axle.

Four steel bars screwed into the cylinder casting form the frame work of the engine. At the rear end these frame bars pass through lugs on the rear axle center housing, the mesh of the driving gears being adjustable by means of nuts and cap nuts on the bars. The heavy coiled springs on the bars behind the nuts on the inner ends of the lugs serve merely to lock the nuts in position. At the forward end the engine is supported by a laminated steel strap consisting of four laminae, which has a tapered

fit on a stud mounted on the engine. This obviously gives a universal support to this end of the engine.

The crankshaft is supported in two roller bearings of the Stanley company's own manufacture, mounted in bearing blocks secured between nuts on the frame bars. The two bearings are both between the cranks, which latter overhang. The crankpin bearings also are of the roller type, while the eccentrics are ball bearing. In the earlier models the crosshead also was ball bearing, but it is now made with a bronze bearing.

The slide valves are of the D type and are made of cast iron. They are operated by the usual Stephenson link motion, which permits of varying the cutoff and of reversing the direction of rotation of the engine for backing the car. The arrangement of the eccentrics, eccentric rods, links and connecting levers is clearly shown in the side elevation of the engine herewith.

Engine Working Mechanism Inclosed

The working mechanism of the engine below the cylinders is inclosed in a sheet copper housing of oval section secured to a cast aluminum header. For the lubrication of the working parts 6 quarts of lubricating oil (Mobiloil, Grade C) is poured into the housing, and it is claimed that this supply lasts for a season. Cylinder lubrication is effected by means of a Madison-Kipp lubricator, which is actuated by a lever from the pump drive crosshead. On the opposite side there is a small hand crank for hand feed. Oil from this lubricator is sprayed into the steam line after it leaves the superheater, and when the steam reaches the engine it is impregnated with oil. The maximum temperature within the cylinders will rarely exceed 700 deg. Fahr., hence the Stanley is free from difficulty from excessive heat in cylinder lubrication. Another point that deserves mention is that the source of lubrication for the cylinders is entirely independent of the source of lubricant for the bearings, and bearing lubrication therefore is not affected by the working fluid in any way.

The engine is geared down to the rear axle at the ratio of 2 to 3, from which it is obvious that the engine operates

at low speed even for the highest car speed. The number of revolutions made by the engine per mile of travel is always the same, and at 30 m.p.h. the engine turns over at 462 r.p.m.

The rear axle is a semi-floating type with Bock roller bearings at the differential and S. K. F. double row ball bearings at the wheels. The front axle is a Stan Par product. The rear springs are full elliptic, 40½ x 2 in., while the front springs are semi-elliptic, 41 x 2 in. All springs are provided with Anderson spring covers as standard equipment. Gabriel snubbers are fitted at both front and rear. The chassis is lubricated by the Dot high pressure system.

A flexible metal hose is used for carrying the exhaust steam back to the condenser. The latter is 23½ in. wide, 24 5/16 in. high and 4 13/16 in. deep. It is located at the forward end of the chassis, in the place usually occupied by the radiator, and is of the fin-and-tube type, with aluminum top and bottom header plates and tanks. There is never any water standing in the condenser, for all condensate drains off immediately to the water tank, located under the front seat.

The steering gear is a Ross having an 18 in. wheel, with aluminum spider.

The brake construction has been greatly improved in the latest Stanley model, the braking surface having been increased by about 60 per cent. The two sets of brakes, of which one set is internal and the other external, act on the same drums which are secured to the rear wheels by six hub bolts and six spoke bolts. In addition to the two sets of brakes, the reversing gear is available for braking purposes and the engine is generally used as a brake in running down hill. To do this the throttle is closed and the reversing gear set in the reversing position, thus making the engine work as an air pump.

The Stephenson link motion is so arranged that the engine can be worked with a cut off of either 28 per cent

or 60 per cent of the stroke. The long cut off gives increased power and is used for starting and under conditions when an unusual amount of power at low speed is required, but for high speed and for all normal conditions the short cut off, which is more economical, is used. The engine is then said to be "hooked up." Reversing and change of the cut off are effected by means of a pedal under the driver's left foot. There are really two pedals combined in one, so they can be operated simultaneously with the same foot. If the car is to be backed, which is accomplished by reversing the engine, the reverse pedal and hook-up pedal are pressed forward together all the way. When the car has been backed as much as is desired, the reverse pedal is allowed to return to the forward speed position. For operating on short cut off the operator presses forward gently on the reversing pedal only until he feels a catch drop into the quadrant, and allows the pedal to remain there. The throttle and reversing pedal are the only power control devices used on the car. There are no universal joints, clutch, flywheel or fan, hence the number of units requiring lubrication is small.

Generator Driven from Rear Axle

For lighting, operating the horn and heating the fuel for the pilot burner in starting, the Stanley is provided with an electric generator which is driven directly off the rear axle, and a drawing of the generator drive is reproduced herewith. The generator charges a storage battery so that electric current is available when the car is at a standstill.

The bodies are of aluminum and have a double cowl effect. All doors are hinged at the front. Genuine leather upholstery is used. The top is of the permanent type. Side curtains of top material are furnished, and are provided with five celluloid lights. Among the items of equipment may be mentioned the electric self-winding clock and a windshield cleaner.

All-Metal, Cushion Type Universal Joint

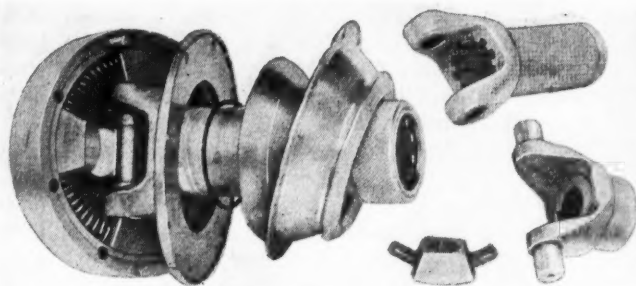
AN all-metal type of universal joint, in which the helically wound springs are placed circumferentially between movable and stationary yoke bushings respectively in order to cushion torsional stresses, has recently been placed on the market by the Hoosier Universal Machinery Co.

As will be seen from the accompanying cut, the casing is a steel forging of L section, provided with one integral and one detachable flange plate or cover. The annular space between the two flanges is filled by four sector-shaped bushings, and four helical springs, placed alternately and in such position that the bushings are 90 deg. apart when no torque is on the joint.

Cushioning Feature of Joint

The sector blocks are bored and ground to fit over the yoke pins. Each bushing is provided with arc-shaped pins, which serve as guides for the spring and hold them in position. Two of the sector blocks or bushings are fastened rigidly to the casing, and the other two are free to move circumferentially against the spring pressure, through a small angle.

The yokes are drop forged and provided with standard S. A. E. splines, or arranged for welding to tubular propeller shafts. Two covers with part spherical surfaces are provided on each side of the joints and these bear



Parts of the Hoosier cushion type universal joint

against felt packings carried in internal grooves on the outer covers.

The casing is tapped with a 1/8-in. pipe plug hole through which either grease or heavy oil can be injected into the central compartment and from which it is carried by centrifugal force to all working parts. Another felt washer is used at the outer end of the spline where it is held in position by a close-fitting knurled cap, which screws over the end of the hub of the splined yoke.

The casing is drilled parallel to the axis of rotation with eight small holes for bolts which serve to hold together the entire assembly.

An Analytical Study of Crank-pin Bearing Design and Lubrication

Part III

It is recommended that the oil hole be located in a low pressure region as shown by comparative wear diagrams. Relation between oil hole diameter, pressure bearing clearance and oil flow are experimentally established.

By G. D. Angle

In charge airplane engine design, McCook Field

SINCE it is desirable to maintain perfect lubrication without resorting to high oil pressures, on account of the bad effects of excessive end leakage, it follows that the manner of introducing the oil to the crank-pin bearing should be carefully studied. A few airplane engines employ oil pressures as high as 100 lb. per sq. in., but the majority maintain pressures of from 30 to 40 lb. only. On the other hand, the pressure within the oil film of the bearing has possibly twice the value of the bearing load, which averages around 800 lb. per sq. in. (mean); therefore it is futile to attempt introducing oil to a crank-pin bearing in the region of high pressures. Moreover, from the ratio of the above values, it is not unreasonable to expect a decrease in film pressure when the oil hole passes a high pressure point; whereas at the low pressure regions, the delivery of oil would probably be assisted by the pumping action which is known to exist.

The best position of a crank-pin oil hole cannot always be located from a polar diagram of forces alone, as it is difficult to take into account the element of time, which is also of great importance. The diagrams shown by Figs. 13 to 21, inclusive, were obtained by plotting a series of rings whose radial dimensions represent, on some convenient scale, the forces acting upon the crank-pin. A ring was laid out on a 180 deg. arc for every force at

the crank intervals used in the polar diagram of forces plotted with respect to crank axis. The mid-point of each arc was on a line through the crank-pin center in the direction of the force, as shown by the polar diagram. The summation of these rings, producing the shaded area whose ordinates are proportional to the product of force and time, is termed the comparative wear diagram.

The high and low pressure regions are clearly indicated by the width of the shaded area. The low pressure regions sometimes extend over a wide arc, and thus theoretically permit a degree of choice in the position of the crank-pin oil hole; however, it is generally recommended that the oil hole be located at a convenient distance forward in the direction of rotation, in order to allow as much time as possible for completely establishing an oil film before the high pressures occur.

When the hole that is bored through the center of the crank-pin is carried full of oil, it can be made to function as a centrifugal oil cleaner if the oil is not introduced to the bearing radially from the center. Placing the oil-hole at either side of the crank axis provides a segment toward the outside which is not in the path of the oil flow. All heavy foreign substances, such as metal and sand, thrown into this segment by centrifugal force, are thereby prevented from passing through the bearing.

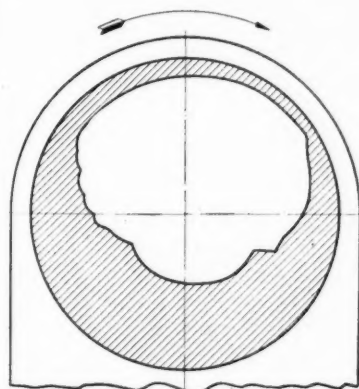


Fig. 13 — Crank-pin comparative wear diagram of a vertical type engine (1800 r.p.m.)

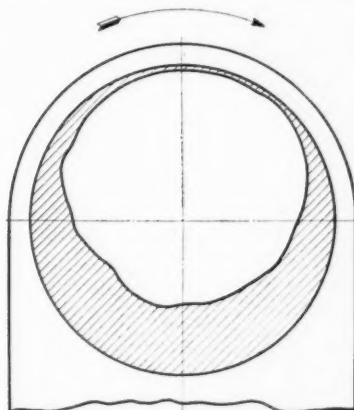


Fig. 14 — Crank-pin comparative wear diagram of a 45-degree V-type engine (1700 r.p.m.)

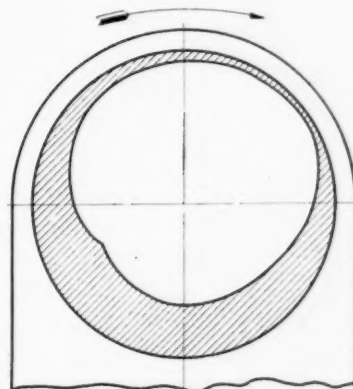


Fig. 15 — Crank-pin comparative wear diagram of a 60-degree V-type engine (1800 r.p.m.)

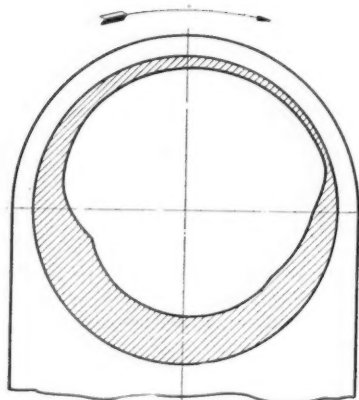


Fig. 16—Crank-pin comparative wear diagram of a 90-degree V-type engine (1800 r.p.m.)

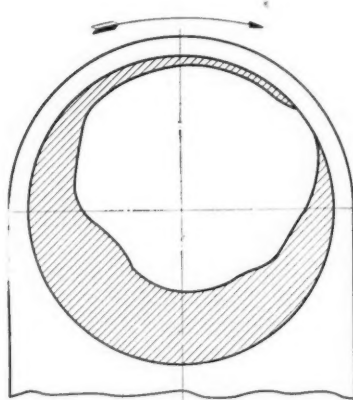


Fig. 17—Crank-pin comparative wear diagram of a 40-degree W-type engine (1400 r.p.m.)

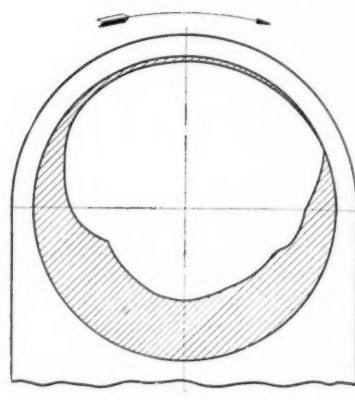


Fig. 18—Crank-pin comparative wear diagram of a 40-degree W-type engine (1800 r.p.m.)

There is not the slightest doubt that this separating action actually exists. During the tear-down and inspection of any engine in which these conditions are provided, the segments will invariably be found completely filled with a heavy mud-like substance that would obviously cause wear in the bearing if allowed to pass through with the oil.

The practical value of correctly locating the oil hole in the crank-pin was made apparent by a comparison of two sets of crank-pin bearings that were run in the same engine for a period of 25 hours, the engine used being a 60-deg. V type with forked-type connecting rods. From the comparative wear diagram (Fig. 15), which shows the conditions of loading existing during this test, it is observed that the highly loaded regions are just beginning at a position 90 deg. behind the crank axis, while the lowest pressure areas are between 40 and 50 deg. forward. The bearings, in which the oil was fed from the hole trailing the crank axis, showed evidence of elevated temperature due to lack of lubricant and were considered unfit for additional service. In the case of the correctly located oil holes, the bearings were found to be in good condition and suitable for further service.

Wear Diagrams for Various Engines

It is interesting to note the general similarity of the comparative wear diagrams for the vertical, V and W-type engines. A crank-pin oil hole position 40 or 50 deg. in advance of the axis in the direction of rotation would apparently be suited to any airplane engine in the above classification. In the case of the radial type engine, however, the conditions are considerably changed. Here we have the high centrifugal load of the big end of the

master connecting rod continually acting upon the inside of the crank-pin, thus leaving without load a wide region where oil may be introduced.

Heretofore there has been very little available data that would assist in determining the size of oil holes and the pressure to be maintained for bearings lubricated by circulating pressure systems. The relation of conditions existing at the crank-pin bearing and in the main oil line, as regards pressure and oil flow, has been rather uncertain, due to the influence of several variables. The oil delivered to the crank-pin bearings, through the hollow crankshaft, is supplied from the main pressure line of the oil pump through holes in the main journals and bearings, which register intermittently. The fact that the flow is not continuous, combined with the possible effects of differences in pressure and size of oil holes, led to investigations concerning the laws of intermittent oil flow in order to establish some useful design data.

An apparatus designed by the writer for these tests consisted of a $2\frac{5}{8}$ in. diameter, motor-driven shaft, having a $4\frac{1}{2}$ in. length of bearing in a cast-iron housing that was water-jacketed so that the temperature of the bearing could be controlled. The housing was provided on either side with connections to a set of holes, of $3/16$, $1/4$, $5/16$ and $3/8$ in. diameter, which were offset sufficiently to register only once per revolution with corresponding radial holes in the wall of the shaft, thereby affording intermittent communication to the interior of the hollow shaft. The inlet holes on one side of the housing were fed from a 30-gal. tank under air pressure subject to variation from 20 to 100 lb. per sq. in. The line from the tank was surrounded for a distance by a steam coil which was used to regulate the temperature of the in-

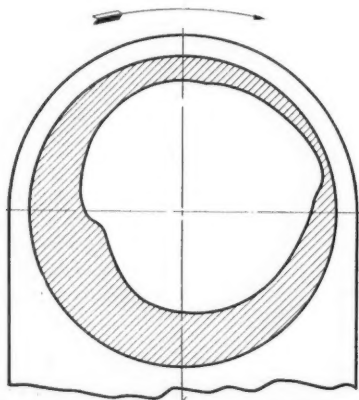


Fig. 19—Crank-pin comparative wear diagram of a three-cylinder radial engine (1600 r.p.m.)

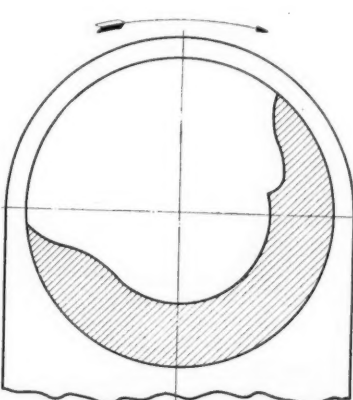


Fig. 20—Crank-pin comparative wear diagram of a nine-cylinder radial engine (1650 r.p.m.)

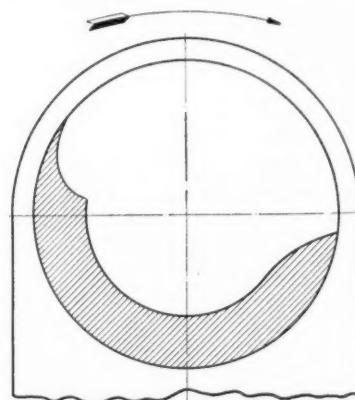


Fig. 21—Crank-pin comparative wear diagram of a nine-cylinder radial engine (1800 r.p.m.)

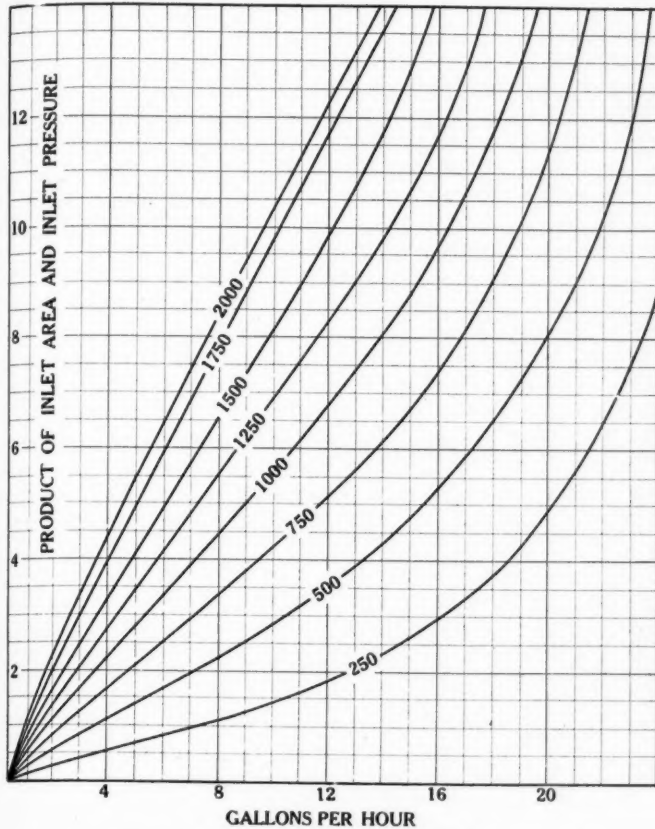


Fig. 22—Curves at various revolutions per minute showing the quantity of oil passing from the end of a hollow shaft with a side inlet having intermittent communication with the main pressure line

coming oil. Stop-cocks were provided on each inlet and outlet connection so that all holes not included in any particular test could be made inoperative. A connection at the end of the housing for measuring the pressure and quantity of oil from the interior of the shaft when desired, and vessels for collecting and measuring seepage at each end of the shaft were also provided. The equipment included the necessary pressure gages, thermometers, and speed indicator.

Veedol No. 1 airplane engine oil was used in all of the tests, the temperature being held as close as possible to 130 deg. Fahr. The tests were made with the pressure of the inlet oil at 20, 40, 60, 80, and 100 lb. per sq. in., respectively. The speeds were varied in increments of 250 r.p.m. up to and including 2000 r.p.m. Previous to conducting the tests, a schedule was outlined to cover the various combinations of speed, pressure, and size of oil holes, as well as other features of interest.

Oil Flow Through Holes of Different Size

The first tests were to measure the quantity of oil that passes through the different size inlet holes and out of the center of the shaft at various speeds and inlet pressures. The results indicate that the quantity of oil decreases with an increase of speed, the rate of decrease declining above 1000 r.p.m., and that the quantity varies directly as the inlet pressure and as the area of the oil hole within limits. The following empirical formula derived from the results of these tests may give slightly low values with high pressures and large inlet holes, but is substantially correct when the product of the pressure and inlet hole area does not exceed 5, or when the flow is not greater than 10 gal. per hour as shown by Fig. 22.

From the following formula it is possible to compute the amount of oil that will theoretically be delivered to the

hollow crank-pin in the usual engine employing a circulating pressure system.

$$(14) \quad Q = \frac{1810 (PA)}{N}$$

A = area of inlet hole (sq. in.).

P = inlet pressure (lb. per sq. in.).

Q = quantity (gallons per hour).

N = r.p.m. of shaft.

Another series of tests were conducted to ascertain the quantity of oil passing from the various side outlets after being delivered to the hollow shaft in the manner of the tests described above. From the results, it is evident that the amount of oil which is delivered to the outlet side of a shaft depends more on the size of inlet than on the size of outlet hole, and that the centrifugal force of the oil within the shaft has very little effect. The formula derived applies only to speeds between 1000 and 2000 r.p.m. This formula is the same as (14) if we assume that the fraction in the denominator becomes zero when the restriction of the side outlet is removed.

$$(15) \quad Q = \frac{1810 (PA)}{N + \frac{6.9}{A_1}}$$

when Q = quantity (gallons per hour).

P = inlet pressure (lb. per sq. in.).

A = area of inlet hole (sq. in.).

A_1 = area of outlet hole (sq. in.).

N = r.p.m. of shaft.

Readings obtained from the interior of the shaft at the end connection, under various conditions of speed, inlet pressure and size of inlet hole, indicate that the pressure varies directly as the inlet pressure, and also as the diameter of the inlet holes, instead of the area as in the case of the quantity tests. The curves (Fig. 23) do not take into account the time required to build up maximum pressure under any given set of conditions, but it was

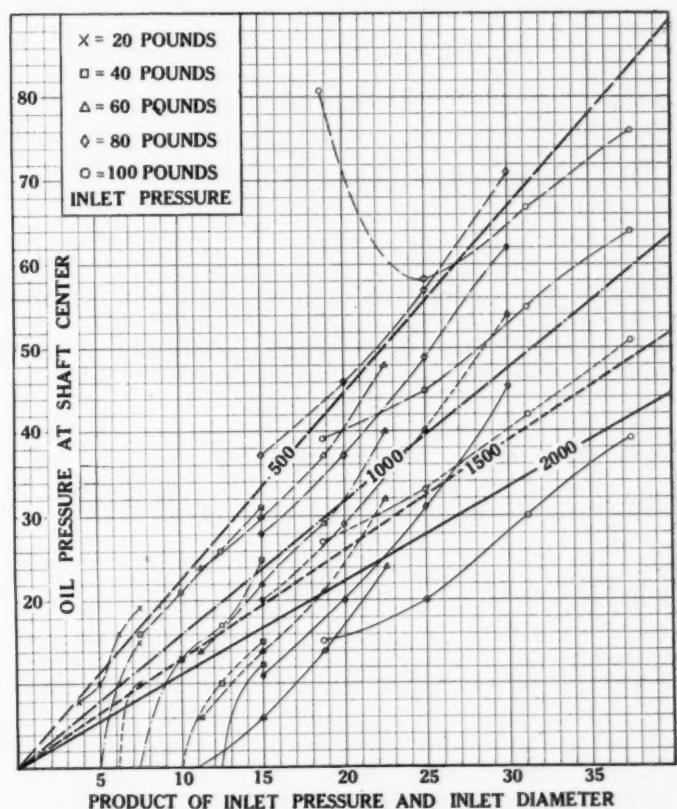


Fig. 23—Curves at various r.p.m. showing the pressure (lbs. per sq. in.) in a hollow shaft which is intermittently supplied through holes in the side wall from the main pressure line

found in every case that maximum pressure was reached within one minute from the beginning of the test.

These tests indicated that the drop in pressure due to speed occurs more rapidly at high than at low pressures. It was also observed that there is a very sudden drop in pressure with small inlet holes and low inlet pressures as zero internal pressure is approached. This may be accounted for by the assumption that seepage is sufficient to relieve the center of the shaft of any measurable pressure under these conditions. The equation derived from these tests is approximately correct for speeds between 500 and 1500 r.p.m. At higher speeds the result may be 4 per cent high for each 100 r.p.m. above 1500.

$$(16) \quad P_1 = \frac{50 (PD)}{\sqrt{N}}$$

when P_1 = pressure inside shaft (lb. per sq. in.).
 P = inlet pressure (lb. per sq. in.).
 D = diameter of inlet hole (inch).
 N = r.p.m. of shaft.

Readings taken at the side outlets showed that the pressure varies directly as the inlet pressure and diameter of the inlet hole. With the larger outlets the higher readings were doubtless due to the centrifugal force caused by the rotation of a larger volume of oil in the radial holes of the shaft. The formula derived from these tests for side outlet pressure is substantially correct for speeds between 500 and 2000 r.p.m.

$$(17) \quad P_2 = \frac{68 (PD)}{\sqrt{N}}$$

when P_2 = side outlet pressure (lb. per sq. in.).
 P = inlet pressure (lb. per sq. in.).
 D = diameter inlet hole (inch).
 N = r.p.m. of shaft.

When the oil was allowed to pass freely through the shaft, from side to side, it was found that the pressure readings at the center varied considerably and followed no law that could be expressed by a simple formula. In general the pressure increased with increase of inlet pressure and size of inlet hole, and decreased with increase of speed. With certain combinations of inlet and outlet holes, it was impossible to measure any pressure at the center of the shaft. This was true when small inlets and large outlets were used, but since the use of small outlets did not necessarily increase the internal pressure even with the higher inlet pressures, it is believed possible to maintain internal pressures under these conditions only when large inlet holes and high inlet pressures are employed.

Tests were conducted with two solid shafts, the first having a clearance from 0.0005 to 0.0015 in. which represented a closely fitted bearing, and the second a clearance from 0.002 to 0.004 in., which represented a freely fitted

bearing, in order to determine the factors influencing seepage from the ends of a bearing. A hole for introducing the oil was located at the top of the housing one-third the length of the bearing from one end, thus giving a 2 to 1 ratio of the distance from the inlet hole to each end. This was done in order to study the effect of length on the amount of seepage.

The results of these tests indicated that the seepage—

- (1) increases with r.p.m.,
- (2) decreases with bearing length,
- (3) increases directly with inlet oil pressure,
- (4) is not affected by clearance within the range tested.

Item (1) is interesting, as this was not to be expected. Item (4) is quite contrary to expectations and may be due to a condition peculiar to the apparatus employed for these tests. It is believed that a further increase in clearance would show a considerable increase in seepage, and furthermore that reversal of load, such as occurs on a crank-pin bearing, would also induce larger leakage from the ends of the bearing.

In these intermittent oil feed investigations, no account was taken of the frictional resistance. This can be computed for conditions of high speed or light loads from the following formula:

$$(18) \quad Tf = \frac{\pi \times D^3 \times L \times N}{505,000,000 \times c}$$

when Tf = torque of fluid friction in ft. lb.
 π = absolute viscosity (centipoises).
 D = diameter of shaft (inches).
 L = Length of bearing (inches).
 c = clearance on diameter (inches).
 N = r.p.m.

A review of these tests may indicate the source of lubricating troubles in some of the present day airplane or high-speed automobile engines. One point of particular interest is the fact that the pressure within the shaft decreases with increase of speed. This might account for the lubricating troubles that occur in some engines that operate at high speeds. In such cases, where there is evidence of lack of oil at the crank-pin bearings, it would appear necessary to employ one or more of the three possible means of correction—increase the size of the oil hole; increase the oil pressure, or provide a groove so as to obtain a more continuous flow.

When computing the oil pressure at the crank-pin bearing from the above data, it must be remembered that the centrifugal force set up by the oil contained in the crank-shaft should be added. Corrections should also be made for differences in viscosity. These tests were all run at practically constant inlet and outlet oil temperatures, therefore it is difficult to accurately predict the effects of change in viscosity upon intermittent oil feed.

(Conclusion)

Progress with the French National Fuel

A FURTHER step in the direction of rendering compulsory the use in France of motor fuels in which there is an admixture of 10 per cent alcohol has been made by the Commission des Mines et de la Force Motrice, which has prepared a bill to be presented to the Chamber of Deputies making licenses for the importation of gasoline, benzol, benzine and other light liquid fuels conditional on the importer purchasing each month a quantity of alcohol equal to 10 per cent of the motor fuel which he brought into the country the previous month. The Government will fix the price of the alcohol, the percentage of the mixture and the price at which it will be sold to the consumer, this being done to insure that the com-

posite fuel shall not be sold at a higher price than gasoline. Meanwhile, experiments are being carried out with methods of employing ordinary power alcohol in association with gasoline instead of the dehydrated spirit supplied by the Service des Poudres, since undiluted alcohol will always absorb moisture from the atmosphere, and it is feared that the preliminary operation of passing alcohol vapor through a column of lime will not entirely remove the difficulties incidental to the use of alcohol containing a percentage of water. The Comité Scientifique du Carburant National is now experimenting with a pulverizer which is said to insure a suitable mixture of gasoline and alcohol, at the same time that the water is dissociated into oxygen and hydrogen.

*"Lubrifications." July, 1920, page 3.



The FORUM



Better and Safer Steering Systems Advocated

A plea setting forth the shortcomings of the present conventional system, and contrasting them with the advantages of the design in which the wheels are pivoted about an axis in their central plane.

Editor, AUTOMOTIVE INDUSTRIES:

Referring to the Editorial in AUTOMOTIVE INDUSTRIES of August 31st, pointing out the many defects in the construction of the steering system parts of all American cars; although your criticism may appear rather sweeping to some, it is, in fact, rather mild, for without doubt the present design and construction of all steering systems, whether applied to the cheapest or the most expensive American car, is the most defective of all the systems of parts of the automobile, and as a result of such defective design and construction, the steering system is today the most dangerous element in the whole car construction.

Naturally, the most dangerous element in any automobile is an inefficient braking system, but this system has been so looked after, that in great measure, the probability of its not working, has, to a great extent been eliminated, for it is much more essential to stop a car when necessary, than to start it, and if this stopping is not accomplished at the desired instant, it would be impractical and impossible to try to continue to operate the car.

However, in the event of the brakes failing at any time to operate properly, one is able to know exactly what is going to happen and can always choose between running into a tree or the side of a house; not so, however, in the case of a broken steering gear, for before you have time to apply the brakes, the wheels will spread and the car "turn turtle" or will take a "bee line" for a wall or precipice and all control of the car is absolutely lost. Therefore in this respect, the broken steering gear is at all times the most dangerous element of the whole car.

As you point out, faulty design, poor materials and careless manufacture, one or all, have produced many serious accidents and still these same manufacturers continue to turn out, year after year, these same defective steering system parts, although these defects in design are well known and even a short investigation might show the careless manufacture and how to overcome these and improve their safety.

Some of the defects of the cross link, to which you refer, are as you point out, due to carelessness and are absolutely unnecessary, but at the best, the entire link or rod and lever system is at all times subject to very heavy and unnecessary strains, which could be entirely avoided by a correct principle of construction of the wheel steering knuckle,—by replacing offset knuckle by a knuckle at the center of the front wheel, producing a true castor effect.

The offset knuckle is in fact, the weak point of the entire steering system and is entirely responsible for all

accidents and the danger of the steering system and the only reason it has been possible to continue to use this offset knuckle is, because the entire steering linkage system is made unduly heavy and strong to counterbalance or overcome its defects. Even your journal, while acknowledging these defects, has suggested as a cure, a heavier linkage instead of trying to remove the cause.

The necessity of having the amount of offset of the knuckle as little as possible, is shown by the general effort of all car designers to reduce this to the greatest degree possible, and bring it right up to the inner edge of the front wheel. If the offset knuckle is correct, in principle, it would make no difference whether this offset was one in. or six in.

Now the first effect of the offset knuckle is the tendency of the front wheels to spread apart in rolling, even over the smoothest roads, to transmit all road shocks to the steering gear linkage and lever system, and to produce a series of short blows throughout the entire system up to the steering wheel itself and to overcome the effect of these blows on the hands of the operator or chauffeur, it is necessary to introduce an otherwise absolutely unnecessary and expensive irreversible steering gear or nut to take up these shocks. The amount of these shocks increases as the distance of the offset knuckle from the center of the wheel increases.

Resisting Wheel Tendency to Spread

This tendency of the wheels to spread, must be resisted by the cross equalizing rod, so that this is always under great tension or compression, depending upon its location either in front of or behind the front axle; and the short levers are always under the same degree of transverse strain, and subject to a continuous crystallizing effect due to these same road shocks. Similarly the steering lever leading to the steering post lever is subject to the same blows and the two operating levers to the same transverse shocks.

Some idea of what this strain amounts to, can be gained from the fact that certain automobile makers have stated, that in assembling their cars, to assure parallelism of the front wheels, they recommend these be assembled with a $\frac{3}{8}$ in. toe in, in order that they may be parallel when running. Now this simply means that under working conditions and on all kinds of ordinary smooth roads, the two equalizing rod levers must always be under a similar amount of spring, or bend, and with extraordinary shocks, under a much greater strain. The equalizing rod, when

under tension, may be assumed to be always unchanged in length and even when under compression, is practically so, as owing to its large diameter, the shortening, due to the very slight degree of bending, is negligible.

It is this excessive and unnecessary strain upon the levers that is the cause of all steering gear failure and the many accidents and deaths, and the levers subject to the heavy transverse strains, naturally, are the first to crystallize and fail. Any attempt to prevent these accidents by making these parts heavier is of little avail, for these blows become so heavy, it is practically impossible to provide against breakage.

In addition to the above, the offset knuckle requires to have the front wheels inclined inward at the ground, in order to give an easy steering effect, which increases the tendency of the car to "turn turtle" when rounding curves or turning corners; besides giving an unequal tire wear.

Design of Center Knuckle

On the other hand, the centre knuckle entirely overcomes all these defects and, if properly designed, costs even less than the present offset knuckle. It is simpler in construction and does away with several parts and is cheaper to machine. The steering pin is hidden out of sight, within the wheel itself and gives the whole front axle a simplified appearance.

The center knuckle, on the contrary, would prevent all accidents in the event of a breakage anywhere in the entire steering system as in such a case, it would only run straight ahead if uncontrollable (assuming the steering wheel was so placed) and would so continue until the car was stopped or otherwise directed. So long as the levers and link, leading to the steering wheel were intact, the car would be under absolute control and any of the other steering system parts might even be broken without it being known or felt. If the left, or steering wheel is controlled, the right wheel would automatically follow the same, unless forcibly prevented from doing so. In fact, with each rear wheel driven separately, it might be possible to control the direction of the car entirely by the relative speeds of the two engines, and drive the car around a corner instead of steering it around the corner.

The first effect of the centre knuckle is to give a true castor effect and to cause the front wheel to run straight ahead at all times and the greater the direct blow or road shock the greater the tendency to continue to run straight ahead and not to be deflected from the straight line. Only a glancing blow would tend to deflect the front wheels temporarily from a straight line and immediately this passed or is overcome, the wheels would again automatically return to the straight ahead direction. Then front wheels would continue indefinitely in a straight line until they are pulled out of the straight line by the operator or chauffeur. Therefore the steering reduces itself merely to keeping the hands upon the steering wheel in case of emergency, but does not require to be closely held and directed as in the case of the offset knuckle and none of the road shocks are transmitted to the steering wheel.

The expensive irreversible steering gear or nut is therefore entirely unnecessary and can be replaced by a less expensive construction, giving the easiest and direct form of linkage so as to give the desired motion to the front wheel, with as little motion as possible to the steering wheel, instead of being compelled to turn the steering wheel two times around, more or less, in order to give the desired motion to the front wheels.

As the spreading tendency of the front wheels is thus entirely done away with, and the road shocks are taken in the plane of rotation of the front wheels, there is no transmission of any of these strains or shocks to the steer-

ing levers and rods, with the result that there is no strain upon the steering system parts so long as the front wheels run straight ahead, and when the wheels are deflected from a straight line, they are only called upon to produce a strain sufficient to pull the wheels in the desired direction, so that these parts may all be made very light and all of these parts are very much reduced in cost.

With the centre knuckle, the front wheels are vertical, and the easiest possible to steer, as the steering pin is in the plane of rotation of the wheel and has less tendency to "turn turtle" or collapse when rounding curves or corners at high speeds; besides giving better tire wear.

Adjustability of the cross links is not desirable, but rather this length should be fixed; as an easy assembling job, adjustability may compensate for bad working and an inequality in the position of the lever pins, but it should be as cheap to adjust these as the cross links. As you point out, the tendency to wear is great, and adequate lubrication is not usually provided nor are these parts so made as to permit oil or grease being received.

Practically all the existing faults can be overcome and the steering system parts improved without any additional cost and all that is required is the introduction of correct principles and a little good engineering in the construction of these parts.

The condemnation of all American cars for their insufficient brakes is fully justified and these and the steering system parts are the two things on which safety is dependent and no expense is too great to justify their improvement, but when both can be improved at a less cost than the present construction, not to do so is criminal.

W. J. P. MOORE.

Distribution Points for Scandinavia

Editor, AUTOMOTIVE INDUSTRIES:

I note in the Oct. 12 issue of the AUTOMOTIVE INDUSTRIES, a letter concerning the automotive exports into Scandinavia, particularly regarding Copenhagen as a center for distribution. What Mr. Petrie writes does not seem to me to find substantial proof in practice.

The figures of importation into Denmark as quoted by Mr. Petrie do not at all cover the point. I know that at the time mentioned a few American cars went into Sweden via Copenhagen, but it was not a result of Danish undertaking but rather a way to profit on the exchange, which, at that time, made it possible for the Danish importer to re-export the cars at a good margin in Danish Kroners. The ones that suffered were the American exporters, as the Danes did not renew their importations.

Now have a look at the June, 1922, figures of American exports into the three countries concerned. When Denmark imported only 90 cars, Norway took 311 cars and Sweden 961 cars. At the same time, Denmark imported \$700,000 of "parts." I am not exaggerating when I say that most of these parts were consigned to the Ford assembly shops at Copenhagen, and that the majority of them went into Sweden as finished Ford cars.

It is true that Copenhagen has a free port, but there are also free ports in Sweden, in Stockholm, as well as at Gothenburg and Malmo. As a distributing center for Scandinavia, Gothenburg would be far better suited than Copenhagen.

As a matter of fact, it is interesting to note the import figures of American cars into the Scandinavian countries. They have lately reached a size which equals that of the Canadian import figures. This market should be watched carefully by the American manufacturers. Direct dealing, cutting out as many middlemen as possible, is the only way to do considerable business in Scandinavia.

BIRGER JACOBSON.

Valuable Material on Foreign Trade Appears in Recent Books

International exchange and advertising and financing exports are some of subjects offered of interest to automotive executives selling abroad. Handbook of Latin-American countries and volume on automobile pattern making among new publications.

FOUR books that have just reached the reviewer's desk are on the subject of exports and foreign trade and, therefore, it may be expected that they will have considerable interest to those executives of the automotive industry who are engaged in the fascinating business of selling automobiles and equipment throughout the world. Of these volumes, the one by David L. Brown on "Export Advertising" would be the first to attract attention, chiefly because Brown is the advertising manager of the Goodyear Tire & Rubber Export Co. and also is chairman of the export committee of the Association of National Advertisers.

The second book has some direct relation in the industry as it was written by Allan B. Cook, now assistant secretary of the Asia Banking Corp. but formerly assistant treasurer of the Willys Overland Co. and the John N. Willys Export Corp. It is entitled "Financing Exports and Imports," and is a technical study of the financial transactions involved in foreign trading.

Brown's volume also is highly technical, going deeply into many subjects pertaining to advertising in other lands. It is written chiefly about the "ultimate consumer" and discusses, at length, how he shall be approached and captivated through the printed word of newspaper and magazine displays, direct mail effort and dealer helps and motion pictures.

This book appears to be written distinctly for the large companies which are firmly established with branches and factory representatives in the foreign field and which can advertise in a large way. Brown has given practically no attention to the difficulties of the smaller company or the company which is just starting in the foreign field. Also, there is no solution, or the subject at least is barely touched, of the problem obtaining to distribution and of selling distributors, jobbers and dealers, upon any certain product or line.

The volume is devoted entirely to the hope that advertising will bring the consumer to the dealer to demand a certain brand of goods, rather than of inducing the dealer to try to sell that brand to the customers who come into his establishment. The automotive industry, of course, seeks a combination of these two goals, realizing in most cases that without distribution or active dealer assistance it is almost hopeless to count upon consumer demand to merchandise any product successfully.

Brown brings out very carefully the point that the advertising methods which have proved most valuable in this country, with alterations and judicious changes, should be the methods used in the foreign field. This is particularly true for the automotive industry, which, by and large, is developing abroad in exactly the same manner as it did in

this country. Advertising policies and advertising methods in each of these fields then should follow similar lines, with due reservations as to time, place, national temperaments, etc.

What Brown has done is to discuss very fully that part of these methods which relates to creating consumer demand. Unfortunately, the other part of the picture, which most of the automotive companies now seeking entrance into the foreign field or an enlargement of their present business, need, takes up but small space in Brown's otherwise important volume.

Both "Export Advertising" and "Financing Exports and Imports" are printed by the Ronald Press. The third of the four volumes is also a Ronald production, and is entitled "International Exchange." The author is Thomas York, formerly foreign exchange editor of the Wall Street Journal. It is a financial compendium, dealing with the many phases of international financing, the rise and fall of currencies, investments in foreign securities and allied topics.

The last volume is the "Anglo-South American Handbook for 1922," a British book that has been published here by MacMillan. Its author is W. H. Koebel, who has written many travel books concerning Latin-America. This particular volume contains a wealth of valuable trade information concerning the various Latin-American countries.

G. E. Q.

Problems in Pattern Making

YOUNG draftsmen and even more experienced designers are frequently puzzled by the problem presented in making patterns for sheet metal parts of irregular shape such as are used in the manufacture of automobile bodies, especially those in the custom built class. Those who experience such difficulties or who desire to supplement their own knowledge of the subject with that of one who is an experienced instructor in sheet metal work will find assistance in a book entitled "Automobile Pattern Drafting" by Frank X. Morio, recently published by the U. P. C. Book Co., Inc.

The book is, in effect, a course of lessons in pattern drafting for such parts as mud guards, cowls, hoods and body sheets. There is also a chapter on painting and finishing such parts and one describing the stamping methods used in quantity production of automobile bodies.

There are also numerous drawings in the form of line cuts as well as a set of blueprints made on a considerably larger scale, the latter being folded for carrying unbound inside the covers of the book.

American Exports of Cars, Trucks, Tires, Motorcycles and

| COUNTRIES | GASOLINE PASSENGER CARS | | | | | | GASOLINE TRUCKS | | | | | | PARTS |
|--------------------------------|-------------------------|-------------|--------------|-------------|----------------|-----------|-----------------|-----------|--------------|-----------|--------------|-----------|-------------|
| | Up to \$800 | | Up to \$2000 | | \$2000 or more | | Up to 1 ton | | 1 to 2½ tons | | Over 2½ tons | | |
| | No. | Value | No. | Value | No. | Value | No. | Value | No. | Value | No. | Value | |
| Europe | | | | | | | | | | | | | |
| Austria | 2 | \$649 | | | | | 1 | \$364 | | | | | \$11 |
| Azores and Madeira Islands | 1 | 175 | | | | | | | | | | | |
| Belgium | 540 | 170,725 | 55 | \$56,722 | 4 | \$11,785 | 560 | 129,440 | | | | | 139,472 |
| Bulgaria | | | | | | | | | | | | | 13 |
| Czechoslovakia | | | | | | | | | | | | | 653 |
| Denmark | 5 | 3,224 | 42 | 42,162 | | | | | | | | | 14,907 |
| Estonia | | | 2 | 1,723 | | | | | | | | | |
| Finland | 1 | 735 | | | | | | | | | | | |
| France | 10 | 4,620 | 3 | 4,543 | | | | | | | | | 351 |
| Germany | | | 1 | 1,800 | | | | | | | | | 80,915 |
| Gibraltar | | | 2 | 1,926 | | | | | | | | | 344 |
| Greece | | | 1 | 834 | | | | | | | | | 963 |
| Iceland and Faroe Islands | | | | | | | | | | | | | |
| Italy | 203 | 60,215 | 1 | 1,000 | 1 | 5,000 | 30 | 6,404 | | | | | 17,726 |
| Latvia | 95 | 38,110 | | | | | | | | | | | 3,798 |
| Lithuania | | | | | | | | | | | | | |
| Malta, Gozo and Cyprus Islands | | | | | | | | | | | | | |
| Netherlands | 29 | 17,741 | 36 | 36,155 | 3 | 7,390 | | | | | 4 | \$1,880 | 1,234 |
| Norway | 9 | 4,430 | 22 | 21,892 | | | | | | | | | 17,191 |
| Poland and Danzig | 1 | 374 | 6 | 6,875 | | | | | | | | | 14,604 |
| Portugal | 2 | 1,502 | 1 | 1,503 | | | | | | | | | 475 |
| Rumania | | | | | | | | | | | | | 2,873 |
| Russia in Europe | 30 | 12,942 | 5 | 4,223 | | | | | | | | | 2,925 |
| Spain | 252 | 81,111 | 61 | 60,380 | 12 | 37,043 | 550 | 135,323 | | | | | 14,776 |
| Sweden | 8 | 4,077 | 187 | 182,662 | | | | | 1 | \$865 | 1 | 2,192 | 79,457 |
| Switzerland | | | 5 | 7,100 | | | | | | | | | 18,029 |
| Turkey in Europe | | | | | | | | | | | | | 792 |
| Ukraine | | | | | | | | | | | | | 1,856 |
| England | 77 | 47,277 | 114 | 116,971 | 4 | 11,689 | 10 | 9,832 | 38 | 38,197 | 10 | 13,679 | 4,341 |
| Scotland | 1 | 350 | | | | | 2 | 2,080 | | | | | 1,731 |
| Ireland | | | | | | | | | | | | | 10,835 |
| Yugoslavia, Albania and Fiume | | | | | | | | | | | | | 212 |
| North and South America | | | | | | | | | | | | | |
| United States | | | | | | | | | | | | | |
| British Honduras | 1 | 365 | | | | | 1 | 354 | | | | | 461 |
| Canada | 246 | 123,574 | 123 | 140,751 | 37 | 102,675 | 18 | 12,329 | 25 | 41,886 | 3 | 9,063 | 1,259,945 |
| Costa Rica | 4 | 1,458 | 1 | 814 | | | 1 | 342 | | | | | 1,166 |
| Guatemala | 4 | 3,014 | 2 | 2,124 | | | | | | | | | 7,970 |
| Honduras | 1 | 289 | | | | | | | | | | | 1,573 |
| Nicaragua | | | | | | | | | | | | | 66 |
| Panama | 26 | 12,379 | 10 | 13,209 | 2 | 5,050 | 7 | 2,548 | | | | | 1,747 |
| Salvador | 3 | 2,287 | 3 | 3,890 | | | | | | | | | 430 |
| Mexico | 580 | 230,048 | 186 | 195,315 | 30 | 75,917 | 47 | 25,690 | 10 | 6,532 | 1 | 4,900 | 11,344 |
| Newfoundland and Labrador | | | | | | | | | | | | | 2,922 |
| Barbados | 5 | 1,691 | | | | | 1 | 365 | | | | | 61,832 |
| Jamaica | 42 | 21,202 | 16 | 17,662 | | | 10 | 3,640 | 1 | 1,746 | | | 153 |
| Trinidad and Tobago | 8 | 4,944 | | | | | 2 | 728 | | | | | 2,971 |
| Other British West Indies | 30 | 9,530 | 7 | 7,711 | 2 | 6,500 | 13 | 5,434 | | | | | 7,698 |
| Cuba | 221 | 62,018 | 21 | 28,035 | 15 | 37,259 | 39 | 7,723 | 4 | 4,520 | | | 5,342 |
| Dominican Republic | 19 | 6,689 | 7 | 8,303 | 3 | 7,382 | | | | | | | 2,402 |
| Dutch West Indies | 4 | 1,131 | | | | | 1 | 364 | | | | | 77,829 |
| French West Indies | 2 | 748 | 3 | 2,829 | | | | | | | | | 13,386 |
| Haiti | 19 | 10,807 | 1 | 900 | | | | | | | | | 1,040 |
| Virgin Islands | | | | | | | | | | | | | 3,491 |
| Argentina | 235 | 112,041 | 207 | 204,181 | 15 | 34,568 | 28 | 13,639 | 3 | 7,726 | 2 | 5,990 | 4,369 |
| Bolivia | | | 2 | 2,818 | | | | | | | | | 257 |
| Brazil | 59 | 43,663 | 62 | 68,066 | 2 | 4,932 | | | | | | | 740,019 |
| Chile | 8 | 4,332 | 16 | 17,287 | 2 | 9,161 | 17 | 10,891 | | | | | 2,003 |
| Colombia | 7 | 2,725 | 11 | 12,857 | 1 | 2,300 | 3 | 2,559 | 2 | 5,610 | 1 | 3,416 | 185,211 |
| Ecuador | | | | | | | 1 | 450 | | | | | 2,369 |
| British Guiana | 7 | 2,693 | 1 | 1,055 | | | | | | | | | 11,450 |
| Dutch Guiana | 1 | 409 | | | | | 1 | 409 | | | | | 394 |
| French Guiana | | | | | | | | | | | | | 2,154 |
| Paraguay | | | | | | | | | | | | | 400 |
| Peru | 5 | 2,986 | 1 | 833 | | | | | | | | | 289 |
| Uruguay | 118 | 46,186 | 30 | 34,992 | 4 | 11,363 | | | 2 | 3,651 | | | 11,700 |
| Venezuela | 57 | 24,594 | 12 | 12,359 | 2 | 8,038 | | | 6 | 9,924 | | | 31,684 |
| Asia | | | | | | | | | | | | | |
| Aden | | | | | | | | | | | | | 8,637 |
| British India | 61 | 36,905 | 25 | 25,080 | 2 | 7,485 | | | 1 | 398 | | | 894 |
| Ceylon | 15 | 9,064 | 3 | 3,723 | | | | | | | | | 37,495 |
| Straits Settlements | 25 | 14,300 | 20 | 22,547 | | | | | | | | | 807 |
| Other British East Indies | | | 1 | 1,445 | | | | | | | | | 3,713 |
| China | 28 | 14,608 | 16 | 17,616 | | | | | | | | | |
| Chosen | | | | | | | | | 1 | 752 | | | 11,687 |
| Java and Madura | | | 35 | 39,387 | | | | | | | | | |
| Other Dutch East Indies | | | 1 | 916 | | | | | 4 | 3,672 | | | 18,762 |
| Far Eastern Republic | | | | | | | | | | | | | 1,325 |
| Hejaz, Arabia and Mesopotamia | | | 2 | 1,951 | | | | | | | | | 570 |
| Hongkong | 4 | 2,615 | 4 | 3,387 | | | | | | | | | 253 |
| Japan | 122 | 54,506 | 13 | 15,312 | 6 | 16,169 | 75 | 27,600 | 2 | 6,640 | 16 | 41,130 | 8,349 |
| Kwantung | 14 | 5,502 | | | | | | | 5 | 1,820 | | | 65,065 |
| Palestine and Syria | 39 | 18,290 | 12 | 12,818 | | | | | 1 | 3,674 | | | 91 |
| Persia | | | | | | | | | | | | | 6,549 |
| Philippine Islands | 32 | 24,217 | 47 | 47,004 | 4 | 9,161 | 10 | 3,700 | | | | | 6,249 |
| Siam | 3 | 2,261 | | | | | | | | | | | 57 |
| Oceania | | | | | | | | | | | | | |
| Australia | 680 | 411,210 | 533 | 552,708 | 21 | 52,284 | 61 | 71,310 | 86 | 102,576 | 8 | 11,495 | 124,700 |
| British Oceania | 1 | 700 | | | | | | | | | | | 553 |
| French Oceania | 1 | 250 | | | | | | | | | | | 765 |
| New Zealand | 174 | 107,617 | 107 | 111,029 | 3 | 6,486 | 12 | 15,287 | | | 3 | 13,073 | 25,081 |
| Other Oceania | | | | | | | | | | | | | 653 |
| Africa | | | | | | | | | | | | | |
| Belgian Congo | 6 | 2,098 | | | | | 8 | 2,912 | | | | | 1,527 |
| British West Africa | 6 | 4,521 | 6 | 6,162 | | | 9 | 9,304 | 5 | 5,192 | | | 10,848 |
| British South Africa | 54 | 36,704 | 154 | 138,662 | 2 | 5,535 | 3 | 3,024 | | | | | 39,713 |
| British East Africa | 4 | 1,884 | 9 | 9,196 | | | | | | | | | 3,115 |
| Canary Islands | | | 2 | 1,835 | | | | | | | 3 | 4,264 | 3,220 |
| Egypt | 7 | 5,177 | 8 | 7,282 | | | | | | | | | 8,720 |
| Algeria and Tunis | 9 | 3,315 | | | | | | | | | | | 75 |
| Other French Africa | 5 | 1,697 | | | | | | | | | | | 560 |
| Liberia | 1 | 685 | | | | | | | | | | | |
| Morocco | 24 | 8,459 | 2 | 3,000 | | | | | | | | | 8,228 |
| Portuguese East Africa | 2 | 1,585 | | | | | | | | | | | 506 |
| Other Portuguese Africa | 2 | 1,013 | | | | | 1 | 450 | | | | | 4,965 |
| Spanish Africa | | | | | | | | | | | | | |
| Total | 4,297 | \$1,948,343 | 2,266 | \$2,354,445 | 177 | \$475,202 | 1,252 | \$503,805 | 197 | \$245,391 | 52 | \$113,182 | \$3,417,117 |

Tractors for December, 1922.

Canadian Exports

PARTS

Value

\$10

139,47

14,99

80,913

17,725

3,798

1,231

17,191

14,691

2,870

2,925

14,779

79,457

18,021

1,816

4,341

112,972

1,753

10,833

212

441

259,915

1,105

1,515

1,747

430

11,344

2,922

61,832

131

2,971

7,098

5,342

2,402

77,829

13,388

1,049

3,491

4,309

227

749,019

2,003

189,211

21,390

11,450

398

2,156

400

289

| TIRES | | | | | | MOTORCYCLES | | TRACTORS | | PASSENGER CARS | | TRUCKS | | PARTS | COUNTRIES |
|---------|-------------|-------|-----------|--------|-----------|-------------|-----------|----------|-----------|----------------|-------------|--------|----------|-----------|--------------------------------|
| Casings | | Solid | | Inner | | No. | Value | No. | Value | No. | Value | No. | Value | Value | |
| No. | Value | No. | Value | No. | Value | | | | | | | | | | |
| 50 | \$913 | | | | | 1 | \$250 | | | 3 | \$1,395 | | | | Europe |
| 653 | 7,694 | | | 419 | \$686 | 55 | 12,705 | | | 52 | 35,662 | | | \$532 | Austria |
| | | | | | | 17 | 4,460 | 1 | \$1,050 | | | | | | Azores and Madeira Islands |
| 1,557 | 19,450 | 22 | \$642 | 560 | 1,112 | 71 | 16,875 | | | 2 | 1,972 | | | 92 | Belgium |
| 199 | 1,618 | | | 160 | 318 | 5 | 1,250 | | | | | | | | Bulgaria |
| 263 | 3,180 | 11 | 318 | 167 | 277 | | | | | | | | | | Czechoslovakia |
| 577 | 6,973 | | | 70 | 498 | | | 7 | 9,178 | | | | | 5 | Denmark |
| 35 | 807 | | | 35 | 106 | | | | | 1 | 1,520 | | | | Estonia |
| 30 | 261 | | | 60 | 100 | | | | | 1 | 1,358 | | | | Finland |
| 338 | 3,964 | 24 | 561 | 460 | 784 | | | | | 3 | 2,055 | | | 17 | France |
| 6 | 141 | | | | | | | | | | | | | | Germany |
| 651 | 6,904 | 6 | 93 | 20 | 45 | 9 | 2,190 | | | 2 | 2,216 | | | | Gibraltar |
| | | | | | | | | | | | | | | | Greece |
| 75 | 718 | | | 55 | 109 | | | | | 2 | 2,484 | | | | Iceland and Faroe Islands |
| 34 | 367 | | | 44 | 58 | | | | | 1 | 465 | | | | Italy |
| 1,194 | 15,488 | | | 916 | 1,681 | 37 | 9,313 | 2 | 2,350 | 10 | 6,273 | | | 332 | Latvia |
| 2,324 | 32,620 | 70 | 3,400 | 2,254 | 3,588 | 63 | 14,951 | | | 4 | 3,507 | | | 128 | Lithuania |
| | | | | | | | | | | | | | | | Malta, Gozo and Cyprus Islands |
| 577 | 7,136 | 28 | 1,016 | 164 | 314 | 1 | 275 | | | | | | | | Netherlands |
| 98 | 1,371 | | | 138 | 281 | | | | | | | | | | Norway |
| | | | | | | | | 4 | 460 | | | | | | Poland and Danzig |
| 792 | 11,505 | 109 | 2,479 | 313 | 641 | 20 | 5,418 | 81 | 29,271 | 48 | 44,637 | | | 2,611 | Portugal |
| 1,856 | 31,796 | 29 | 963 | 585 | 246 | 18 | 4,615 | | | 153 | 85,665 | | | 475 | Rumania |
| 130 | 1,967 | | | 65 | 94 | 8 | 2,370 | 10 | 6,100 | | | | | 116 | Russia in Europe |
| 163 | 1,498 | | | 98 | 40 | | | | | 4 | 2,926 | | | 38 | Spain |
| | | | | | | | | 25 | 48,750 | | | | | | Sweden |
| 23,141 | 227,101 | 1,227 | 32,402 | 11,705 | 1,762 | 34 | 8,031 | 1 | 1,200 | 2,225 | 1,598,148 | 2 | \$1,751 | 57,617 | Switzerland |
| 107 | 2,159 | 12 | 206 | 134 | 318 | | | | | | | | | | Turkey in Europe |
| | | | | | | | | | | | | | | | Ukraine |
| | | | | | | | | | | | | | | | England |
| | | | | | | | | | | | | | | | Scotland |
| | | | | | | | | | | | | | | | Ireland |
| | | | | | | | | | | 34 | 27,685 | | | 29,022 | Yugoslavia, Albania and Fiume |
| | | | | | | | | | | | | | | | North and South America |
| 26 | 206 | | | 5 | 12 | | | | | | | | | | United States |
| 7,976 | 73,357 | 154 | 7,980 | 3,166 | 3,555 | 38 | 7,989 | 212 | 133,586 | | | | | | British Honduras |
| 66 | 1,826 | | | 68 | 130 | 1 | 220 | | | 2 | 2,900 | | | 159 | Canada |
| 79 | 1,607 | 4 | 137 | 70 | 142 | 1 | 276 | | | 3 | 2,771 | | | 32 | Costa Rica |
| 215 | 1,595 | | | 10 | 14 | 1 | 113 | | | | | | | 3 | Guatemala |
| 10 | 166 | | | | | | | 3 | 3,075 | | | | | | Honduras |
| 2,372 | 16,417 | 164 | 2,589 | 1,278 | 2,281 | 1 | 227 | | | 6 | 7,710 | | | 5 | Nicaragua |
| 54 | 1,160 | 12 | 388 | 63 | 149 | | | | | | | | | | Panama |
| 7,786 | 92,217 | 65 | 2,374 | 8,437 | 12,717 | 5 | 1,014 | 18 | 13,224 | 9 | 12,990 | | | 1,498 | Salvador |
| | | | | | | | | | | | | | | 500 | Mexico |
| 532 | 1,233 | | | 88 | 123 | 2 | 371 | | | | | | | | Newfoundland and Labrador |
| 329 | 4,602 | 49 | 1,040 | 361 | 805 | | | | | | | | | | Barbados |
| 305 | 3,791 | 24 | 310 | 295 | 599 | 3 | 800 | | | | | | | | Jamaica |
| 160 | 1,247 | 2 | 57 | 175 | 275 | | | | | | | | | | Trinidad and Tobago |
| 8,312 | 76,364 | 232 | 6,075 | 3,860 | 6,464 | 2 | 536 | 39 | 14,738 | 24 | 16,295 | | | 221 | Other British West Indies |
| 386 | 4,184 | 26 | 801 | 635 | 972 | | | 1 | 2,401 | | | | | 329 | Cuba |
| 91 | 1,161 | | | 142 | 240 | | | | | | | | | | Dominican Republic |
| 121 | 1,170 | 6 | 84 | 200 | 271 | | | | | | | | | | Dutch West Indies |
| 166 | 1,770 | | | 264 | 467 | 1 | 257 | | | | | | | | French West Indies |
| 35 | 413 | | | 27 | 46 | | | | | | | | | | Haiti |
| 12,997 | 109,785 | 63 | 1,501 | 17,395 | 23,844 | 37 | 8,528 | 306 | 215,472 | 100 | 77,143 | | | 18,305 | Virgin Islands |
| | | | | | | 6 | 1,489 | | | | | | | | Argentina |
| 6,802 | 60,512 | 181 | 3,966 | 4,826 | 7,236 | 2 | 6,680 | 9 | 4,188 | | | | | 379 | Bolivia |
| 810 | 9,796 | | | 385 | 593 | 4 | 1,000 | 10 | 3,512 | 4 | 3,788 | | | 85 | Brazil |
| 410 | 5,296 | 16 | 370 | 381 | 690 | 1 | 100 | 5 | 1,850 | 2 | 1,896 | | | 201 | Chile |
| | | | | | | | | | | | | | | 37 | Colombia |
| 292 | 2,264 | 22 | 330 | 87 | 145 | | | 1 | 3,247 | 11 | 7,359 | | | 129 | Ecuador |
| 6 | 69 | | | 16 | 27 | | | | | | | | | | British Guiana |
| | | | | | | | | | | | | | | | Dutch Guiana |
| 4 | 69 | | | 4 | 9 | | | | | | | | | | French Guiana |
| 825 | 13,917 | 50 | 3,358 | 1,054 | 2,112 | 1 | 324 | 7 | 4,006 | | | | | 42 | Paraguay |
| 4,018 | 39,188 | | | 955 | 1,452 | 9 | 2,403 | 10 | 3,512 | 31 | 26,995 | | | 303 | Peru |
| 801 | 11,968 | 4 | 54 | 2,519 | 4,189 | | | | | 6 | 6,466 | | | 287 | Uruguay |
| | | | | | | | | | | | | | | | Venezuela |
| | | | | | | | | | | | | | | | Asia |
| 987 | 12,347 | 471 | 11,144 | 461 | 825 | 38 | 8,837 | | | 233 | 129,118 | | | 325 | Aden |
| 6 | 192 | | | | | 7 | 1,650 | | | 39 | 20,700 | 21 | 8,016 | 14,083 | British India |
| 639 | 5,782 | 262 | 5,489 | 471 | 623 | | | | | 58 | 24,295 | | | 20 | Ceylon |
| 75 | 138 | | | 75 | 226 | | | | | 26 | 7,498 | | | 11,173 | Straits Settlements |
| 579 | 8,845 | 32 | 847 | 485 | 1,058 | 1 | 167 | | | 11 | 8,708 | | | | Other British East Indies |
| 255 | 2,480 | | | 295 | 500 | | | | | | | | | | China |
| 511 | 6,932 | 270 | 7,158 | 385 | 697 | 16 | 3,796 | | | | | | | | Chosen |
| 264 | 3,854 | | | 30 | 42 | | | 4 | 1,020 | 112 | 38,676 | | | 3,693 | Java and Madura |
| | | | | | | | | | | | | | | | Other Dutch East Indies |
| 441 | 3,572 | | | 250 | 321 | | | | | | | | | | Far Eastern Republic |
| 100 | 1,700 | 30 | 1,260 | 30 | 60 | 3 | 709 | | | 4 | 2,638 | | | | Hejaz, Arabia and Mesopotamia |
| 548 | 7,859 | 345 | 4,025 | 26 | 63 | 96 | 23,994 | 19 | 6,404 | 33 | 23,801 | | | | Hongkong |
| | | | | | | | | | | | | | | | Japan |
| 514 | 6,948 | 16 | 325 | 661 | 989 | | | | | | | | | | Kwantung |
| 54 | 592 | | | | | | | | | | | | | | Palestine and Syria |
| 1,982 | 26,045 | 558 | 9,743 | 1,356 | 2,417 | 13 | 3,182 | | | | | | | | Persia |
| 70 | 667 | | | 16 | 26 | | | | | | | 5 | 1,670 | 716 | Philippine Islands |
| | | | | | | | | | | | | | | | Siam |
| 4,497 | 71,103 | 929 | 28,703 | 2,538 | 7,677 | 654 | 129,659 | 120 | 97,183 | 1,425 | 651,752 | 162 | 51,108 | 62,080 | Oceania |
| 1 | 32 | | | 2 | 8 | | | | | | | 1 | 334 | | Australia |
| 13 | 241 | 2 | 116 | 14 | 35 | | | | | | | | | | British Oceania |
| 3,251 | 45,969 | 137 | 5,259 | 1,894 | 3,733 | 103 | 24,381 | | | 588 | 258,429 | 12 | 4,008 | 881 | French Oceania |
| 50 | 497 | | | 42 | 54 | 1 | 283 | | | | | | | | New Zealand |
| | | | | | | | | | | | | | | | Other Oceania |
| | | | | | | | | | | | | | | | Africa |
| 400 | 7,317 | | | 377 | 1,141 | | | | | 8 | 3,078 | | | 2,041 | Belgian Congo |
| 3,079 | 35,982 | 10 | 277 | 3,238 | 5,096 | 52 | 12,013 | | | 151 | 79,531 | 10 | 3,340 | 11,847 | British West Africa |
| 682 | 6,880 | | | 467 | 1,240 | | | 7 | 4,671 | 6 | 1,764 | | | 590 | British South Africa |
| 65 | 668 | 6 | 122 | 120 | 128 | | | | | | | | | | British East Africa |
| 739 | 8,203 | | | 500 | 778 | 1 | 240 | | | 28 | 14,170 | | | 287 | Canary Islands |
| | | | | | | | | | | | | | | | Egypt |
| | | | | | | | | | | | | | | | Algeria and Tunisia |
| | | | | | | | | | | | | | | | Other French Africa |
| 46 | 455 | | | 45 | 50 | | | 12 | 4,215 | | | | | | Liberia |
| | | | | | | | | | | | | | | | Morocco |
| 208 | 2,702 | | | 439 | 1,077 | | | | | 1 | 593 | | | 26 | Portuguese East Africa |
| 58 | 808 | 180 | 3,031 | 60 | 99 | | | | | | | | | | Other Portuguese Africa |
| | | | | | | | | | | | | | | | Spanish Africa |
| 110,771 | \$1,191,791 | 5,862 | \$151,050 | 79,495 | \$125,680 | 1,437 | \$317,261 | 917 | \$617,458 | 5,475 | \$3,256,230 | 216 | \$73,230 | \$221,403 | |

How Automotive Advertising Value Can Be Increased

Success of any copy depends on degree with which four elements are utilized. These factors are knowledge of audience, subject and language, and sincerity of purpose. Publicity material needs closer attention from general executives.

By Harry Tipper

THE meaning and value of automotive advertising can be materially increased by closer attention to a few fundamentals. These can be discussed most profitably from the standpoint of their effect on the practical sales program of the manufacturer, rather than from the viewpoint of technique which interests only the professional advertising man. The important phases at the present time are those to which the general executive needs to give attention.

Critical articles about automobile advertising copy have appeared recently in *AUTOMOTIVE INDUSTRIES*. The present discussion is an attempt to present constructive remedies for the faults previously criticized.

In approaching the subject of copy it is useless to dwell upon those intangible platitudes with which we have been bombarded for nine or ten years, indicating the attention-value, the interest, the conviction and the action contained in copy. Even though those platitudes be true, they mean nothing when we are through with them. There are, however, four elements which copy must contain and which mark the success of copy in accordance with the degree with which they are used. Named in the order of their importance, they are:

- Knowledge of the audience.
- Knowledge of the subject.
- Knowledge of the language.
- Sincerity of purpose.

Walter Raleigh, in his book "On Style," says that the speaker automatically provides his own audience. "One touch of the archaic in his words, the doors are closed and the people are assembled in the seclusion of the quiet drawing-room, while a single turn of peasant speech or a rustic meaning given to a word which is not allowed in genteel parlance, the roof is blown off the villa, and the inhabitants are set wriggling in the unaccustomed sunshine." The man who writes makes his own audience, and if he does not understand the audience that he wants to reach, he will not reach it, whether he has 10,000,000 circulation or not, and whether he uses the best media that the country provides or not. You have seen copy which has been sent out by the advertiser, with the same type, with the same surroundings, with the same illustrations and with the same sentiment expressed, appearing in the *National Geographic* and *Vanity Fair* at the same time, without any change. In fact, I have seen copy going to the technical engineer, to the merchandising dealer, and to the layman, who had no interest in either of the other two, without a single change and from the same place.

And then, think of the generalities which must occur when you don't know your audience, because if you cannot speak the language of the people, you are confined to those statements which, meaning so little, cannot be criticized. We have some adjectives that have been so thoroughly worked out that we cannot use them ourselves. They have been misplaced and misused to such an extent that we can't even consider them.

Let us grant for the moment that advertising is successful from the mere reiteration of the name—as Matthew Arnold said, "beating it upon our weary brains like a hawk"—and that from mere familiarity and identification we can impress to a degree the audience of indiscriminating laymen, yet at what an expense of waste that must be, at what a tremendous inefficiency!

The second element is, knowledge of the subject. We have gone a long way from this question in the last few years. In fact, you have heard it stated in some quarters that a writer is better off if he doesn't know a subject. It is true that there are some men, and they are reasonably scarce in this world, who are provided with such facility of language and such a capacity for adaptation, that they are able to seize upon the essential features of a possibility and present it to an audience after a very superficial acquaintance with it. But the average man is neither eloquent nor discerning unless he knows his subject, and I don't believe that the average man is any more eloquent or discerning in his written language than he is in his spoken language. We are working, in the advertising business, with the average man. We have thousands of copy writers, we have thousands of people who must write to this public that we reach, and they can't be all of that scarce character of genius which has a native capacity for adaptation of language. Yet we say it is not necessary to know the subject. That perhaps is another reason why we have such a lot of glittering generalities about a product.

Knowledge of Subject Essential

The machinist knows that no two machines made from the same patterns, machined and measured with the same micrometers, gaged to the same gages and finished in the same assembly shop, are quite alike, and any man who has worked with machines for weeks at a time knows that you must humor one machine a little differently from the other. And no two products were ever quite alike. And certainly no two business organizations that produce those products were ever quite alike. If it is not possible for the advertising man to know his subject well enough to seize upon

the individuality of his own product and present it to his audience, his work is undoubtedly inefficient and he has lost the large opportunity of his purpose. Knowledge of the subject should be absolutely a *sine qua non* in all advertising.

It is true that every man who knows his subject does not necessarily know how to write about it, but if a man has the first primary quality, which I have stated before and regard as of the most importance—the knowledge of his audience—and follow that with the knowledge of his subject, then indeed he can write and write so as to express eloquently to his audience the possibilities that lie within his own grasp.

Insufficient Distinction Between Audiences

Knowledge of the subject is something which we have sadly neglected in almost all of our advertising. Why should we insult an engineer by addressing him as a layman? Why should we pretend that a merchant who is merchandising his goods cannot be reached in merchant language and with the merchant individualities of your product? Why should we think that the man who reads the National Geographic reads it from the same angle and expects the same language as the woman who reads Vanity Fair? Why is it that we can't spend more on the individual piece, wisely expend it in time and money and make the individual piece really count for a much larger percentage of actual action?

Further, this matter of knowledge of the subject goes a little deeper, for unless we know the organization that we are dealing with and the product that we have to sell, we will not only find it difficult to reach the audience, but we will find it difficult to understand the whole business of advertising in that connection, for human nature does not discriminate according to our values, with our products, it does not view them in the same way that we view them. The outside, general human nature has nothing in common with our ordinary point of view as manufacturers, and it is not steeped in the endless operations that belong to that product. It views them from a different point of view, and, therefore, we must know something of the subject, as well as something of the audience in order to translate what we know into what they will understand. Unless we know it, how can we translate it?

The third point is knowledge of the language. The constant recurrence of "superior," "smart," "beautiful," etc., in automobile advertising is illustrative. Surely there is something more about that wonderful construction, "the automobile" of any particular make, than that kind of a statement. Why, it embodies the brains of wonderful engineers, it has taken thousands of men to make, it has all kinds of separate and distinct parts in it that are themselves a beauty because of their strict usefulness. Can't anything be said of that but a mere word, that it is "the smartest," a superlative that means less than anything else, a qualification that does not qualify and a statement that really doesn't claim?

Perhaps we are a little bit like the man whom Walter Raleigh talks about, who, "being introduced to a language of a hundred thousand words that quiver through a million of meanings is tempted by the very wealth of inheritance to be careless, and is content if out of those million highly tempered swords he can construct a few clumsy coulters." For language is something which cannot be used by the careless. It is like putting an inefficient workman in charge of the finest of instruments, which must be handled by the most delicate of craftsman's hands. It has grown up through the centuries, expressing at every stage some additional values of human emotion or human activity or human operation that have accrued to it, that have invented new combinations of letters to express themselves; it is in

itself an epitome of human progress from beginning to end. If we knew how to use it, why, we should be able to write it. If we knew the language we should then know something of the audience itself, for it has expressed within it the whole gamut of human emotions. But, we know so little that the average man's vocabulary is not more than between five hundred and one thousand words out of the hundred thousand and more that are possessed by us. Even of those words only a few hundred are ordinarily used—because in conversation, as a writer put it, in the ordinary flow of talk, not accuracy but immediacy of expression is required and one passes on with his inadequate expression lest he be left in the belated analysis as the tide of talk flows past him. He wants to be immediate and not accurate, because he knows that his sympathetic hearer will infer from his own poverty what he himself could not express.

But for those who attempt to reach thousands to millions of people at one time, such an inadequacy of expression cannot be countenanced, and it is impossible in written language to allow the interference which may be allowed in conversational tones, just as it is impossible to stand up on a platform and say the things as they would be said if the platform were not there. So we cannot afford to know language as little as the people that we reach. We must know language at least well enough to be simple, and it is astonishing how much knowledge it takes to be really simple. It is a curious thing about all mechanical arts, that they have progressed from crude complication to simplicity, so that they represent now in any one single machine more beauty than they ever did, because of the fact that the superfluities have been cut away. It is true that it has taken thousands and thousands of men to reduce one of those superfluities, and that it has taken more and more parts to make the operation more simple, just as it is true that it takes more study to understand language and it takes more words to arrive at a simple definition, more knowledge of words. One cannot expect to be lucid unless one knows sufficient of language to know why a word should not be used in a particular connection.

But back and above all this estimate of some of the fundamentals that are required in good copy and some of the things that we ought to do and do not do in copy, lies the one feature which must be a part of the writer's equipment, if he is to reach his audience, and that is, sincerity of purpose. It is particularly true of the written word, what is true to some degree of the spoken word, that no man carries conviction unless he himself be convinced, for the written word has a way of carrying its own insincerity upon its face, of measuring to the cold eye of the man who reads it, without the atmospheric surroundings that help the speaker, of measuring to him the fallacies and the lack of conviction of the writer.

No Thought Without Words

And how are you to be convincing if you don't know the audience—if you don't know the subject and if you don't know the language?

People say to me sometimes, "You know, I have an idea if I could only express it," but they forget that thought is born in language and that thought does not exist without words. They forget that there is no such thing in the world for useful purposes as an idea that cannot be expressed. The very usefulness which we have is limited to the possibilities of our expression. There is little use in being sincere if we cannot translate.

Finally, of all the things which man has to do, there is nothing quite so great as that of impressing other people or expressing to other people in writing. The whole of the accumulated knowledge of the world is compassed in a few books, because it is written.



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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly) July, 1907.

Proof That Safety Campaigns Pay

TANGIBLE evidence that safety first campaigns have yielded very beneficial results is shown by the recent announcement of the National Casualty and Surety Underwriters that reductions in motor vehicle insurance rates had been made because of the decrease in the loss cost per car last year.

Commercial car owners will gain most by this action of the insurance companies. This brings to light the interesting fact that the number of accidents due to motor trucks has decreased while accidents from passenger cars have shown no proportional improvement. This may be explained partially by the fact that commercial vehicle operators had most room for improvement and hence were subject to closer supervision to eliminate the reckless driver.

The automotive industry should welcome this step by the large insurance companies as it is a movement in the direction of reducing the fixed charges of mo-

tor vehicle ownership. There are many people who find these charges an obstacle to ownership of a motor vehicle for which no reduction in operating costs will compensate.

Decrease in the number of accidents, loss of life and expense of owning a motor vehicle will furnish more ammunition for safety first campaigns and all will help the industry in the long run.

Traffic Problems Grow

MARKETING costs are reduced by quantity sales possibilities, provided no outside factors upset normal calculations. Dealers in big cities have a large number of prospects within easy calling distance and consequently should have lower unit selling costs than dealers whose prospects are more widely scattered. Experience does not indicate that this rule always holds true, however, since many sales resistants are growing up in the big cities.

Traffic difficulties, in particular, are becoming more pronounced every year. They have already hindered sales materially in some places. Automotive manufacturers will be directly affected by solutions and attempted solutions. Major Elihu Church of the Port of New York has proposed belt line highways around urban centers, as one means of minimizing congestion. Suggestions of merit are forthcoming from other sources. Every proposal which gives any indication of sanity and constructiveness is worth serious consideration by the industry.

Farmers Trying to Cut Costs

PUBLICATIONS which are close to the farmer naturally are gratified because of his increased purchasing power. That gratification is universal. When the farmer fails to prosper to a reasonable extent, at least, the whole country suffers. The addition of \$2,000,000,000 to the farm income by increased crop prices, therefore, is highly important.

Competition is just as keen on the farms as it is anywhere else. For that reason the farmers are wisely endeavoring to keep the cost of production down to a minimum, largely through the use of labor-saving machinery and equipment. This includes trucks and tractors.

Cooperation among farmers is steadily increasing and orderly marketing is being developed in a way to net more for the producers without raising the cost of living for consumers. The cooperative marketing movement has grown amazingly in the last three years and trucks are coming more and more into use.

If farm costs are to be kept down tractors are essential. Comparatively little interest has been displayed in them since 1919, but the outlook now is much more encouraging. Keen observers declare this is the time to do missionary work by means of demonstrations and other practical experiments. Farmers may not buy tractors in large volume this year, but they will next if they have no more misfortunes.

Will Larger Section Tires Be Generally Used?

RECENT announcements to the effect that a well-known make of taxicab is to employ tires of 4½ in. or larger section, is leading to some speculation among engineers and automobile executives as to the possible use of tires having a 5, 6 or 7-in. section, mounted on rims of 20 in. diameter and fitted to passenger cars of medium and light weight as well as to those in the heavy weight class. At least two of the largest tire manufacturing concerns are said to be going after what is termed oversize tire business. Another report is to the effect that all large tire manufacturers are anticipating rapid advancement in this class of tire business.

The taxicabs referred to above are reported to have secured regularly under service conditions a life in excess of 14,000 miles on 29 x 4½-in. tires. It is claimed that these tires have decreased fuel consumption, greatly improved riding qualities, prolonged the life of the chassis and decreased skidding tendencies.

Tires of large sections require lower inflation pressure for a given load, and thereby unquestionably better the riding qualities of the vehicle.

For this, if for no other reason, they are certain to receive careful consideration on the part of passenger car manufacturers and it may well be that more such tires will be used in the future, especially if the first cost is not materially greater than that of tires now in general use. Even on a basis of higher first cost, there is decided possibility of marked success providing the number of miles per dollar is increased by use of the large section tire.

There has already been some tendency toward the use of smaller diameter tires which tend to lower the vehicle without materially changing the cost of the tire.

The use of 29 x 4½, 30 x 5, 32 x 6 and 34 x 7-in. tires involves the use of 20-in. rims, as compared to 23 and 24-in. rims which are now generally standard. This, in turn, might mean smaller brake drums on some cars and would involve a new set of standards in respect to wheels as well as in tires and rims. It would also involve an increase in the number of tire sizes manufactured and consequently carried by dealers all over the country. None of these are insurmountable difficulties, but they are factors in the situation which must be given careful consideration.

Nearly a year ago some tire manufacturers announced new sizes of pneumatic tires for trucks which involved the use of 16 and 20-in. rims. Some truck manufacturers have been loathe to adopt this size of tire, but it is understood that they have been used to a limited extent and are slowly growing in popularity.

It is as yet too early to make any definite prediction as to the future of the large section tire, but its probable advantage and the fact that it has already proved successful in some applications, makes it worth while to follow closely developments in this line.

AUTOMOTIVE INDUSTRIES will be glad to have the views of vehicle, tire and parts manufacturers, who desire to express further opinions on this very interesting subject.

New Increase Made in Tire Prices

United States First to Announce Change

All Types but Solids and Straight
Side Fabrics Advanced
10 Per Cent

NEW YORK, March 13—Tire prices are on the rise again for the second time this year, an increase being made by the United States Tire Co., effective Thursday of this week. The advance had been expected because of the rising rubber market and the labor condition.

Other companies in this section are expected to follow suit.

The new schedule advances prices 10 per cent on everything except solids and straight-side fabrics. In the case of the clincher Nobby tread the advance is 7½ instead of 10 per cent, while the 30 x 3½ cord will be priced at \$17.85 to the consumer.

Akron Will Meet Increase

AKRON, March 13—Tire manufacturers in the Akron district will meet the 10 per cent price increase of the United States Tire Co.

Akron companies now are revising their schedules and will announce the increases just as soon as the new rates are decided upon. It is expected that the price increase will be made effective as of March 15 by most companies, even though some may not announce their increases until after that date. Whether all companies here will join the movement is problematical. As always is the case when prices are elevated, each company holds off, anxious to have some competitor initiate the movement.

Manufacturers say another increase, in addition to that enforced the first of the year, is imperative, due to steadily mounting production cost. The biggest factor is the increasing price of crude rubber due to operations of the Stevenson rubber export tax law, enacted by Great Britain a few months ago. Crude rubber has increased in cost to American manufacturers more than 150 per cent since last October, and there is every prospect of the price advancing to at least 50 cents a pound and probably more.

Another factor entering into the proclaimed necessity for higher revenues from tire sales is the labor situation. Practically all Akron manufacturers have been compelled to give their employees 10 per cent bonuses in lieu of wage increases and are faced now by a demand
(Continued on page 645)

Business in Brief

NEW YORK, March 15—Acceleration in the already rapid rate of expansion in trade and industry was noted last week. There are comparatively few lines which did not experience this strong revival. Basic industries enjoyed the greatest boom but jobbers and retailers came in for their share.

Steel products advanced all along the line. Demand from railroads for locomotives and cars and from automobile and implement manufacturers and for structural material is keeping the steel mills under pressure not experienced for three years. Copper leads the non-ferrous group of metals in price advance. Pig iron production for the month of February aggregated 2,994,187, the largest output ever recorded in that month. Buyers are paying premiums to insure quick replenishment of supplies.

Other products which show great gains in prices are raw cotton and cotton goods, raw silk which approaches 1920 prices, and building material. The latter has reached a point which threatens future building activities.

Severe weather tended to delay transportation in many sections of the country and deliveries were retarded. Heavy sales of rubber footwear were reported. Moist conditions benefited crops in the Southwest and West.

Car loadings aggregated 830,223 for the week ending Feb. 24. This was an increase of 12,445 cars over the week previous and reflects greater industrial activity.

Industrial stocks made general advances and favorable trade reports tended to force them to new high points. Bonds remained irregular and comparatively inactive. Foreign exchange were quiet.

MERRILL SUCCEEDS GILLETTE

MINNEAPOLIS, March 12—E. A. Merrill, who was vice-president and treasurer of the Minneapolis Steel & Machinery Co., has been elected president, succeeding G. M. Gillette. G. L. Gillette has been chosen vice-president and Cal Sivright treasurer. W. C. Rich has been reelected secretary. J. L. Record continues to be chairman of the board.

Rubber Association Will Assist Hoover

Names Committee to Serve in Advisory Capacity in Proposed Research

NEW YORK, March 13—Still waiting for action by the Rubber Growers' Association of London on the report of its committee which conferred with representatives of the Rubber Association of America on the Stevenson Restriction Act, the rubber interests of this country have turned their attention to the efforts of Secretary of Commerce Hoover, who is investigating the possibilities of rubber growing in countries other than those flying the British flag.

With a \$500,000 appropriation from the Government with which to conduct this research, Hoover is leaving no stone unturned in his efforts to secure the co-operation of the automotive interests. He appeared before the members of the National Automobile Chamber of Commerce last Thursday and asked for assistance, and it is likely that a committee will be appointed by the car makers.

In addition, the rubber interests will help, although there has been a division in the ranks through Harvey Firestone's organizing a movement of his own to help Hoover. As yet Firestone has not named his committee which is to prepare the resolution of protest to the British Government.

Hotchkiss Heads Committee

The Rubber Association, however, has selected an unofficial advisory committee which will line up under the Hoover standard. On this committee are H. Stuart Hotchkiss, chairman, vice-president of the United States Rubber Co.; B. G. Work, president, B. F. Goodrich Co.; Horace De Lissier, president, Rubber Association of America; A. H. Brown, Meyer & Brown, Inc.; William Pfeiffer, Miller Rubber Co.; William O'Neil, General Tire & Rubber Co.; and P. W. Litchfield, vice-president, Goodyear Tire & Rubber Co.

In the absence of Hotchkiss, who is in England acting as liaison officer between the Rubber Association and the Rubber Growers Association, C. B. Steger, president of the United States Rubber Co. will act as chairman.

On the committee as alternates are G. M. Stadelman, vice-president, Goodyear Tire & Rubber Co.; W. O. Rutherford, vice-president, B. F. Goodrich Co.; J. C. Weston, president, Ajax Rubber Co.; and W. E. Bruyn of L. Littlejohn & Co., Inc.

(Continued on page 646)

Quarter May Double Output of Year Ago

January and February Exceeded
First Three Months of 1922
by 145,708

NEW YORK, March 12—Total production of cars and trucks in January and February of this year was 145,708 in excess of the entire output for the first quarter of 1922, which until now held the record for that period in the production history of the industry.

The current month will surpass the 172,720 total of a year ago by a considerable figure and, unless there is a radical downward revision of schedules in the meantime, will round out a quarter doubling that of a year ago.

Despite the fact that major automobile producing plants are operating on increased programs they are unable to keep pace with the demand, which is reported in heavy volume from practically all sections of the country. Ford, with an output of 116,000 cars in February, plans to build 150,000 this month and has orders on its books for more than 200,000. Other companies are similarly situated and are expanding factory operations as rapidly as possible.

February Surprising Month

February was a surprising month with its output of 271,000, which was 30,000 more than January production and was surpassed only by June and August of last year, the former with 289,011 cars and trucks and the latter, 273,425. This record is all the more remarkable in view of the fact that February was a shorter working month than either of the others. It was the eleventh consecutive month to go above the 200,000 mark.

While carload shipments increased from 33,900 in January to 35,700 in February and shipments by boat advanced from 800 to 900, driveaways moved forward from 31,400 to 42,760, indicating that the rail situation is forcing more and more this means of delivering finished cars. There is little indication that any of the output is being stocked in quantities by either manufacturers or dealers, the former making deliveries as fast as transportation facilities permit.

Some plants report a low supply of material, shortage of labor in steel producing areas having the effect of keeping stocks of steel to a minimum. This condition is aggravated to a de-

Orders for Steel Should Be Made Far Enough in Advance to Permit Grouping of Its Manufacture

By C. T. KINGSTON,

Manager of John Brennan & Co. and President of the National Association
of Purchasing Agents

Detroit, March 12.

SHORTAGE of steel and other material in plants of the automotive industry at this time is largely the fault of the buying policy of the companies affected and could have been avoided by a reasonable estimate of coming requirements and general market conditions.

That some companies are offering premiums for immediate deliveries is a condition that can be viewed only with apprehension by the industry generally, a situation tending to disturb the orderly processes of business and to weaken the general economic structure.

Companies which have analyzed their requirements intelligently and made commitments therefor are not finding it necessary to offer premiums for deliveries and are not short of material. There is not much likelihood that they will be short, as the steel mills are not finding it difficult to make shipments on materials which were ordered sufficiently far in advance to give them a chance to prepare for it.

Steels ordered sixty days in advance are coming through on time, a large part of it ahead, probably to suit factory convenience in manufacture. No premiums are being exacted on such shipments, and future orders are not being disturbed by buyers who enter the field at the last minute.

There is no question in my mind of the capacity of steel mills to take care of requirements of American industry for all of the year with available labor. It is necessary, however, that they be given opportunity to produce to capacity by getting orders far enough in advance to group manufacture on all classes of material they are called upon for. They cannot produce efficiently when they are forced to scatter operations.

Practically all of the steel bought by automotive factories is alike and there should be no difficulty about estimating requirements and getting the orders in early. It is not as if there were likely to be sudden changes in manufacturing as in plants of other industries. Neither is it likely that there will be any falling off in prices, but rather a stiffening throughout the year.

Factories which are seeking immediate deliveries are getting them at premiums and they will continue to be able to get them because there are any number of steel plants which make a specialty of premium business. The large plants with the bulk of their orders ahead can turn to premium business to fill in their schedules. Automotive factories placing advance requisitions will find steel plants glad to take them so as to leave the immediate market open for the premium buyer.

To insure the industry getting all the steel needs for the year it is necessary to buy ahead. It is also necessary to be prepared to take shipments at factory convenience, and though this may result in temporary overstocking at times, the condition in the steel industry warrants all possible cooperation.

Present conditions in the general industrial life of the United States will, in my opinion, continue through to next January. It is not likely that the labor shortage in July and August will be such that rising costs will cut down on the general prosperity, but in my opinion the check will come early next year when manufacturers restrain operations to protect themselves against possible poor conditions in the presidential year.

gree by inadequate rail movements from those areas to car producing centers. There is no shortage in any of the plants, as yet, however.

Most encouraging is the progress that is being made in the truck branch of the industry, demand being increasingly good, with slack sales reported only in sections of the Middle and Southwest. The opening of spring is expected to bring those territories back into the market, as among the readiest purchasers.

It is not to be expected that truck building will take such pronounced strides forward as feature the production of passenger cars, expansion

being more dependent upon general business conditions. Industrial centers are consuming much of the output but the swing toward the farm districts is becoming more and more apparent. Thus production is expanding.

Approaching spring is proving a stimulus to operations in tractor making plants. It is regarded as certain that with the better conditions existing among farmers this branch of the industry will experience a pronounced revival this year.

Activity among parts makers is marked by an increased volume of orders and an accompanying good condition with collections.

Unit Makers Expand Factory Operations

Feel Effects of Greater Demand
for Motor Vehicles, Largely
Passenger Cars

MILWAUKEE, March 12.—Production schedules of unit and parts makers in this district experienced a further enlargement in the past week to ten days as the result of the expansion of vehicle output, largely passenger cars. The automotive equipment industry is virtually operating full blast on orders for prompt delivery, and have been falling behind on shipping directions despite the heavier operations, as orders are steadily mounting higher and higher.

Jobbers are being pressed for stocks by dealers, more in anticipation of a brisk spring demand than any immediate heavy call. In all departments of the automotive industries the principal effort seems to be to fortify against what appears now to be a definite shortage of merchandise of all descriptions to meet the so-called spring rush.

Estimates of Demand Too Low

Passenger car factories as a rule find themselves in the position of having made conservative estimates when production schedules for the first quarter or first half of 1923 were fixed and placed in effect at the beginning of the year. Distributors and dealers in nearly every section of the country are taking all the cars they can get by rail or boat, and this movement from the source is gaining daily with the worst of the winter believed over, highways becoming passable and temperatures milder, making driveaways again possible with regularity.

Tire manufacturers in this locality are operating on schedules representing a liberal percentage of increase over the average 1922 production, and shipping goods as rapidly as they go through the factories. Demand is active and orders cover requirements as far ahead as June 1 in many cases.

Retail Sales on Upgrade

With retail sales of passenger cars in the Milwaukee territory again on the upgrade, following a slack period since the middle of February brought extreme cold waves in rapid succession and one or two blizzards that made even the trunk highways out of Milwaukee impassable for from one to two weeks, local dealers are showing more and more concern about getting cars from the factories for warehouse stocks. Floor stocks are moving so well that storage space is constantly being relieved of pressure and enabling dealers not only to accept but to seek larger supplies from distributors or factories.

In 1922, the months of April and May furnished the high spots of monthly sales. So far March sales have been considerably in excess of last year, with

ANOTHER GOOD CROP NEEDED BY FARMERS

MILWAUKEE, March 12.—The Milwaukee works of the International Harvester Co., manufacturing tractors, small farm engines and cream separators, is now operating at a little better than 60 per cent of capacity.

The sale of tractors has been making some headway in recent months and while far from a normal level, is believed due for steady improvement. Farmers are more optimistic, it is stated, and this is reflected by increased sales of gas engines and separators.

It is said that it will require one more favorable crop to place farmers in a financial position to make necessary purchases of new machinery and replacements.

selling effort being prosecuted with unusual intensity.

Dealers apparently have not gone out of their way to spread propaganda concerning the possibilities of advances in car prices, but the public seems to be mindful of some such movement, and any number of sales are recorded based on the "hunch" on the part of the buyer that waiting to buy is going to cost money. The feeling is spreading that manufacturers will be compelled to raise their prices.

Jones Quits Presidency of Kelly-Springfield Tire

NEW YORK, March 13.—Alfred B. Jones has resigned as president of the Kelly-Springfield Tire Co., the resignation being accepted at today's meeting of the board of directors. As yet no successor has been chosen, nor has Jones announced his future plans.

H. L. Moses, general counsel of the company, was elected to the vacant place on the board. Jones had been with Kelly-Springfield for two years, coming from the B. F. Goodrich Co., where he was vice-president in charge of production.

ADAMS AXLE AT JACKSON

DETROIT, March 12.—A branch factory of the Adams Axle Co., Findlay, Ohio, is to be established at Jackson, Mich., in a building leased from the Earl Motors Manufacturing Co., which has not been used heretofore. When equipment is installed, the plant will have a capacity for 200 sets of axles daily, all of which will be devoted to the requirements of Durant Motors.

JOHN E. NORWOOD DEAD

BALTIMORE, March 12.—The death is announced of John E. Norwood, the founder and president of the No-Leak-O Piston Ring Co. of this city.

Philadelphia Plants Operate at Capacity

Body-Making Companies Report
Night Shifts and Increased
Employment

PHILADELPHIA, March 12.—The automobile business here continues good in both the new and used car divisions, especially the former. The accessory business is characterized by spottiness and trucks are selling slowly.

In the manufacturing line, briskness is apparent. The Edward G. Budd Manufacturing Co., maker of automobile bodies, and the Budd Wheel Corp. report capacity operations with night shifts in several departments. The number of employees is about 20 per cent greater than a year ago.

Officials of the American Motor Body Co. assert that advance orders thus far received, together with business in sight, indicate that the organization will continue operating at capacity throughout the year. This concern has 1800 employees at the plant this year, as compared with 600 last year.

The J. G. Brill Co. is active in filling orders for gasoline-propelled cars for railway companies, chiefly to be used on branch lines. This company has 2000 employees at work. Last year it had 900.

Experiment with New Car

The company has delivered all the gasoline-propelled cars to the Pennsylvania Railroad that were ordered last year, and has turned over to the Philadelphia & Reading Railway Co. one car for use on the Tuckahoe branch of the Atlantic City Railroad. Forty gasoline-driven cars were produced last year. So far in 1923, twelve have been delivered, and it is said by officials of the company that numerous roads are making inquiries. The company is now experimenting with a car having a larger engine than any used heretofore by the concern. It is said that this car will be capable of drawing a trailer.

Herbert Lloyd, president of the Electric Storage Battery Co., states that the new plant at Crescentville will soon be placed in full operation. The demand for automobile and radio equipment continues unabated, making it necessary to work night shifts in numerous departments. The number of employees at work is far ahead of that of a year ago at this season.

Springfield Coach Works Busy

SPRINGFIELD, MASS., March 13.—The Springfield Coach Works is operating its enlarged plant at top capacity for the production of Rauch & Lang, Stevens-Duryea, Apperson and Mercer bodies. A production schedule has been drawn calling for 1000 bodies this year, a large percentage of the bodies being taken by Rauch & Lang, chiefly for its gasoline taxicabs.

Belt Line Highways Proposed for Cities

Major Church Tells N. A. C. C. of Plan Which Would Mean Increased Use of Trucks

NEW YORK, March 12—Truck members of the National Automobile Chamber of Commerce, at their special meeting last week, listened to Major Elihu Church, transportation engineer of the Port of New York and a member of the General Staff of the United States Army during the war. Belt line highways around cities to speed up motor trucking was Church's theme.

Church outlined the aim of the newly formed National Motor Truck Highways Association, with which he is identified, which seeks to develop truck trunk line highways and facilitate and lower cost of distribution by increased use of motor trucks.

The big idea in Church's speech was the need for developing belt line highways around the cities. In dealing with this subject, Church said:

Viaducts or Sunken Roads Needed

Where motor truck trunk line highways encounter cities they must never pass their traffic through the community—they must take it around on motor truck trunk line belt lines. Where traffic is destined to a city the main highway must not merely go into the city and connect with its streets. Cities must be circled by one or more systems of truck line belt lines so that trucks may reach any part of the community without going through the congested districts.

Do not think that these highways can be at the street level where they enter or circle a city. A grade crossing on an intensively used motor highway is more dangerous than a railroad grade crossing. Truck traffic must be on viaducts or in sunken roads. This is necessary both to expedite the through traffic and to safeguard pedestrians and local traffic.

Facilities without service are almost worthless. Highways must be operated. The way military transport was passed over the roads of France showed the wonders that can be accomplished. Motor traffic must be despatched just as trains are despatched on a railroad. It is very simple and the results are a joy to all. The rules about not stopping on the highway so as to block traffic—the orders not to pass around any moving truck ahead—all this makes it possible for an enormous tonnage to be moved over the highways with satisfaction and dispatch.

Farm Survey Report Made

The truck manufacturers also listened to the farm survey report compiled by F. W. Fenn, secretary of the N. A. C. C. truck committee. This survey took in 1218 counties in the United States and showed that more trucks are needed on farms in approximately 60 per cent of the counties. The survey indicates a definite market for motor trucks in practically every section of the country, so far as potential demand is concerned. This cannot be interpreted to mean that this entire demand is immediate but it

P. O. ASKS INDUSTRY FOR HELP ON TRUCKS

NEW YORK, March 12—At the request of the United States Government, the National Automobile Chamber of Commerce and the Society of Automotive Engineers will reorganize the motor truck department of the post office, which, it is said, is sadly in need of scientific management.

There are 4000 trucks operated by the post office and it is felt that the Government is not getting 100 per cent efficiency out of them. The N. A. C. C. and the S. A. E. will make a thorough investigation of the service and recommend a scientific plan of operations for routing, dispatching, servicing, maintenance, etc.

As a first step in this direction, Coker Clarkson, secretary and general manager of the S. A. E., is conferring with First Assistant Postmaster General Bartlett, gathering data, etc., for the committees that will work on the problem.

does promise good truck business for 1923.

The probabilities, according to the report, are that about 78 per cent of this demand is for one and two-ton trucks. This is in general accordance with the manufacturing facilities of the industry, inasmuch as a little more than 80 per cent of the 1922 output consisted of trucks of two tons or less capacity.

Its Millionth Car Produced by Chevrolet February 22

DETROIT, March 12.—Production of the millionth Chevrolet was effected Feb. 22, Washington's birthday, according to officials of the Chevrolet Motor Co., the noteworthiness of the feature being overlooked in the rush of manufacture of the season. A later check-up by plant executives showed that the company had gone many thousands beyond the mark without realizing it.

The fact that the millionth car was turned out on Washington's birthday was only a coincidence and had not been staged to identify itself with the holiday. Under ordinary business conditions the holiday might have been observed with suspension of manufacture in honor of Washington, but with the heavy rush of buying the holiday was unknowingly celebrated by passing the million mark.

Chevrolet production is now running at the rate of 1500 daily in all plants, and officials declare that the problem is one of distribution only. There is no break now apparent in the power of the market to absorb all cars built. Practically all cars leaving the Flint plant are being driven away to meet the exigencies of the railroad situation.

Hoover Patent Suit Awaiting Decision

Advisory Report of Master in Chancery Goes to U. S. District Court for Final Ruling

NEW YORK, March 12—Advices received here from San Francisco state that Special Master in Chancery H. M. Wright has declined to hear additional evidence in the Hoover bumper patent case. This suit was brought by the American Chain Co. against the Chester N. Weaver Co. of San Francisco, selling the Lyon bumper and involved in the case are the Hoover and one of the Lyon bumper patents.

As the matter now stands, therefore, the advisory report of Master in Chancery Wright, which was handed up to the United States District Court in San Francisco in December is still before the court for consideration and final action. Before the validity and priority of the Hoover patents are determined, it will be necessary for the court to hand down its decision, which may or may not be in conformity with the report of the Master in Chancery. It is understood that either way the case goes, an appeal will be taken.

Acts as Advisor Only

The testimony in the case was taken at the direction of the court, and in accordance with an agreement between the parties by H. M. Wright, as a special Master in Chancery, "subject to the full consideration of the court," and in his report to the court Mr. Wright said:

"The attention of the court is called to the phrase 'subject to the full consideration of the court,' a phrase not common in the ordinary form of order of reference in this district. I take it that this restricted reference renders this report advisory in its character. * * * The court must reach its independent conclusions, aided by the master's labors."

Curtiss Aeroplane Plans Two Companies from One

NEW YORK, March 14—Plans have been made for a reorganization of the Curtiss Aeroplane & Motor Co. The plans call for no new financing, it is said, and results in the decrease of the present outstanding capitalization. It is proposed to create two new companies out of the present organization, one of which will be a purely manufacturing company. The other will be engaged in liquidating assets. One will be known as the Curtiss Aeroplane & Motor Co. and the other as the Curtiss Assets Co.

The latter will buy commercial aeroplanes and engines and spare parts worth approximately \$1,600,000, and also all the American airplane patents from which royalties now are received. The Assets company will issue \$2,731,500 certificates of beneficial interest.

Educating Bankers Brings Cooperation

Sending Financial Reports One Means of Selling Them on Value of Industry

DETROIT, March 12—Consistent effort by many companies in the industry in educating bankers on the importance of the automobile in national development is believed by executives to have had an important part in bringing about the present era of cooperation. Although it is admitted that there are still sections in which the automobile is frowned upon to a considerable extent, the general attitude of the banking fraternity is declared consistently better than it ever has been.

In the smaller towns and country districts this is asserted to be especially true, particularly as applying to low priced vehicles. It is rarely now that the banker remains to be sold on the economy of low priced vehicles, and purchasers of any standing are quickly accommodated. The old attitude of the banker determining who shall and shall not own automobiles has given away to a feeling that the ownership of a car is an asset to the earning power of the individual and should be discreetly encouraged.

Automobiles Help Districts

There is no longer the mistaken idea that car purchases mean only the taking away of so much capital from a district and its concentration in Detroit or other automobile centers without any return to the district in question. Bankers have learned, officials declare, that the shortening of distances between farm and town has put money into the district in the form of more time for necessary farm work and increased efficiency of the individual.

Farm work and farm life has been made much more agreeable to the individual by shortening the distances between formerly widely separated points. More opportunity is given the farmer to get about which has resulted in increased business for the small town tradesman. By adding to the opportunities of the farmer it has added to the attractiveness of the life and has helped to curb materially the migration from farm to city.

Adopt Circularization Plan

In bringing these arguments for the automobile to the bank, several companies in the industry have organized a systematic circularization plan which is declared to be working out in a completely satisfactory manner. A changing attitude has been noticeable since the plan has been in progress, and it will be continued so long as there is reason to believe that the cause of the automobile can be helped by this means.

One of the ways of building up bank support that is being practiced by the

OLD TIMERS SEEKING LARGER MEMBERSHIP

CHICAGO, March 10—Development of the Old Timers' Club, composed of veterans of the automotive industry, into a country-wide organization powerful enough to make its influence felt in legislation and other matters pertaining to the industry is planned by Harry P. Branstetter, president, and other members of the board of directors who were elected at the annual meeting of the club in Chicago the week of the national automobile show.

Branstetter said that he believed several thousand manufacturers, dealers and others occupying responsible places in the industry can be found who would be willing to pay \$5 a year to defray the cost of the club's annual banquet and provide a surplus to carry on the affairs from one year to the next. The plan is to make the organization as simple as possible, without elaborate by-laws and regulations, and to depend upon the standing of its members and the dignity of the organization for its influence.

industry is the mailing of financial reports to bankers by leading companies. Bankers have been found to be chilly toward certain lines because they feared the manufacturing company was not thoroughly sound, and therefore that the purchase would be unduly depreciated and the bank subjected to loss if the buyer failed to make good on notes.

The main intention of the educational work, however, was to disabuse the pleasure note so often connected with automobiles and to substitute the idea of utility. Manufacturers carrying on this work declare that the advertisement recently published by Atlanta banks in connection with the automobile show there, indicates how strongly the bankers are lining up in favor of the industry, particularly in the South where there was a long entrenched opposition.

McCALL ACTS FOR WINTHER

KENOSHA, WIS., March 12—Alex B. McCall of this city has been appointed trustee in bankruptcy for Winther Motors, Inc., succeeding Judge Clifford E. Randall, whose election was not ratified by the referee because he had been serving as legal counsel for the bankrupt prior to the institution of proceedings.

W. OSCAR SHADBOLT DIES

NEW YORK, March 12—W. Oscar Shadbolt, head of the Shadbolt Manufacturing Co., maker of commercial bodies and trailers, died Sunday night at his home in Brooklyn. Mr. Shadbolt was in his seventieth year.

Receiver of Republic Rubber to Sell Plants

Action Taken to Allow Plans for Reorganization to Be Consummated

CLEVELAND, March 12—C. H. Booth, receiver for the Republic Rubber Co. and the Republic Rubber Corp. of Youngstown, will sell the plants and assets of the corporations in one block at a public sale, to be held in the court house at Youngstown not earlier than April 5. The order for the sale has been made by Federal Judge D. C. Westenhaver.

In connection with the announcement of the sale, Booth says:

In order that a definite reorganization of the Republic Rubber Co. may be consummated, the company will be sold about the middle of April as a going concern. Properties will subsequently be vested in a new corporation to be organized under substantially the same name.

The Republic company has shown remarkable increased sales in the last fourteen months. Sales for January, 1923, increased about 110 per cent over January, 1922. February sales increased about 50 per cent over the same month in 1922.

Assets Total \$8,165,096

In a statement under date of Feb. 8, 1923, the receiver placed the assets of the two corporations at \$8,165,096, the largest items of which are permanent land buildings, machinery and equipment, valued, on June 1, 1917, on a reproductive basis, at \$4,246,262; cash, \$528,597; accounts receivable, \$1,315,833, and inventory, \$1,940,983.

The total creditors' liabilities are given as \$4,494,669. The outstanding stock is placed at \$6,753,200 first preferred; \$1,343,000 second preferred, and \$2,453,335 common.

Through ownership of stock the Republic companies control the Canton Blackstone Co. of Canton, which is a consolidation of the old Knight Rubber Co.

Booth was appointed by the Federal Court in this city on June 22, 1921, on the application of Arthur L. Irish, Elizabeth Hine Cates and the Brighton Mills.

Material Bought at High Cost

In the application it was stated that during the war times the raw material used by the companies was scarce, competition for purchases of it was keen and the company was forced to lay in a large supply at a high price in order to keep production going, that later the price for raw material dropped and prices for the tires also were lowered, with the result that the company suffered a heavy loss.

The receiver has been operating the plant since his appointment.

Sealed bids may be submitted to the receiver at Youngstown prior to the sale. On the day of the sale these bids will be opened and read, after which open bids will be called for.

(Continued on page 646)

Road Men to Discuss Uniformity of Laws

Conference Will Be Held in Harrisburg, Pa., on the Call of Governor Pinchot

HARRISBURG, March 12—America's leading road builders and highway experts will attend the nation-wide conference called by Governor Pinchot for this city March 23 and 24 to discuss the best methods of highway construction. Among the speakers will be Col. Frederic S. Greene, highway commissioner of New York; Thomas H. MacDonald, chief of the Bureau of Public Roads, Washington; Charles J. Bennett, highway commissioner of Connecticut, and H. G. Shirley, chairman of the Virginia Highway Commission.

On the evening of March 23 Governor Pinchot will entertain the highway experts at dinner in the executive mansion, and on the following day Paul D. Wright, Pennsylvania's new State highway commissioner, will be their host at luncheon.

A round-table discussion of "The Experience of the States in Traffic Regulation" is expected to elicit much information that will lead to uniform laws in the future. Bennett, who has made a special study of traffic rules, will lead in the discussion.

Greene, a practical road builder, will review road construction work at one of the meetings. Construction and maintenance will be discussed by MacDonald.

Governor Pinchot will deliver the address of welcome and outline his plan for the development of durable types of road that can be used successfully in given localities. Hundreds of persons, including members of motor organizations from all over the country are expected to attend, and colleges that teach road engineering have been requested to send delegates.

Crosby Line Will Devote One Boat to Car Shipping

MILWAUKEE, March 12—So important has become the transportation of motor vehicles from Detroit and other Michigan factories to the West and Northwest by Great Lakes vessels to the Milwaukee gateway that the Crosby Manufacturing Co. of Milwaukee will operate one large freight steamer exclusively in this service commencing with the 1923 season of navigation, opening April 1.

The Crosby company and other cross-lake vessel operators have been increasing facilities for carrying passenger cars and trucks throughout the winter, giving continuous service between Muskegon, Manistee and Milwaukee. Now provision is being made for a direct service between Detroit and Milwaukee by water, the Crosby line being the first to extend such service to this degree.

CAN REFUEL AIRSHIP WHILE IT IS FLYING

NEW YORK, March 12—Tests made at Mineola have proved that it is possible to refuel and deliver messages from one airplane to another while in flight. Flying at sixty-five m.p.h., Lawrence B. Sperry, in a Sperry Messenger, weighing less than 800 lb., made contact with another plane eight times at different altitudes.

His machine was equipped with a wooden upright fastened to the upper wing, so that when he approached the other plane, a De Haviland, it was possible to touch with the upright the end of a twelve-foot metal ladder suspended from the larger plane, thus demonstrating that planes could take on supplies from a lighter craft, for example, a dirigible, by means of ladders. In the tests both aviators were equipped with parachutes, but these were not needed.

The steamer Thomas Davidson is now in drydock at Milwaukee for general overhauling and reconstruction of the interior to give the largest space possible for bulk loading of motor vehicles. The Davidson will be placed on the Milwaukee-Detroit run about April 1. Not only will the vessel be engaged in carrying cars from Detroit to Milwaukee, but, because Milwaukee is one of the most important parts centers in the country, it will have plenty of cargoes of parts, materials and equipment to carry from Milwaukee to Detroit on return trips to make this exclusive service profitable.

Developments Occur in Ridgeway Venture

PITTSBURGH, March 12—The question as to whether there will be built the so-called \$10,000,000 automobile plant at Ridgeway, W. Va., has become a complicated one as the result of developments this week. Pihl & Miller, Pittsburgh contractors, declared that they had shipped the first car of steel for the erection of the buildings, had received payment and were prepared to make further shipments shortly, in order that actual building operations might be started in the spring. The order was placed with the firm by William Jordan, acting for parties unknown.

At the same time, State Auditor John C. Bond of West Virginia was endeavoring to get in touch with Jordan to inquire, under the authority of the "Blue Sky Law," into the genuine business nature of the boom at "New Detroit," as the town has since become known. Bond stated, on the occasion of a personal trip to Ridgeway, that the inquiry was solely to satisfy the State as to the legitimacy of the proposition and to determine whether it was merely a lot selling scheme.

Aeromarine Airways Will Extend Routes

Network of Lines Planned—Chicago to Be Added to Cleveland-Detroit Circuit

NEW YORK, March 12—Expansion plans are announced by the Aeromarine Airways which are expected to result in a network of aerial commercial transportation routes following the waterways and coast lines of the United States. While these plans are being formulated the company will put a fleet of thirty ships into commission this spring, which will work on three major routes already laid out. Last year fourteen were in commission.

The Cleveland-Detroit route will be enlarged by adding Chicago to the circuit, while a second route will go from New York to Newport to Boston and possibly to Portland. The company also will maintain its New York-Atlantic City service.

The company, in planning for its national expansion, has appointed an Aeromarine advisory board, consisting of thirty-five industrial, banking, and aeronautical men, who will cooperate in arousing the country to the necessity of developing support for commercial aircraft. This committee is as follows:

Rear Admiral W. F. Fullam, United States Navy; Colonel Sidney D. Waldon, formerly president of the Detroit Aviation Society; Colonel J. G. Vincent, vice-president of the Packard Motor Car Co.; Colonel H. H. Emmons, president of the Detroit Board of Commerce; Allan Jackson, fifth vice-president of the Standard Oil Co. of Indiana; John D. Larkin, Jr., vice-president Larkin Soap Co.

R. C. Hyatt, vice-president Union Trust Co., Cleveland; W. E. Scripps, vice-president of the Detroit News; E. C. Romfh, president the First National Bank, Miami; E. G. Sewell, president Miami Chamber of Commerce; Professor Edward P. Warner, Massachusetts Institute of Technology; C. J. Tilden, chairman Division of Engineering, Yale University.

C. F. Marvin, chief of Weather Bureau; Gordon Lee, formerly chief of the Automotive Division, Department of Commerce and now with the Yellow Cab Manufacturing Co.; Colonel H. W. Alden, chairman of the board, Timken-Detroit Axle Co., and General Alberto Herrera, chief of staff of the Cuban Army.

Three New Models Added to Line of Duplex Truck

DETROIT, March 12—Duplex Truck Co. has added three new models to its line, a 1-ton and 1½-ton, both somewhat lighter than the regular models of this size, and designed for light delivery and rapid hauling requirements, and a 2½ to 3-ton.

The two light models are built for pneumatic tire equipment, with overcapacity built into the chassis at points where misuse or overloading might cause trouble. Prices on the models are \$1,495, \$1,985 and \$2,975, respectively.

TIRE MAKERS FILE ANNUAL REPORTS

Sales by Seiberling Aggregated \$3,845,779

Balance Sheet Places Current Assets at \$1,810,418—Liabilities, \$892,249

AKRON, March 12.—Sales of \$3,845,779 and net profits, after payment of interest and other charges, of \$56,878 for the fiscal year ending Dec. 31, 1922, were reported by officers of the Seiberling Rubber Co. at the first annual meeting of its stockholders here today. The company was organized by F. A. Seiberling late in 1921 with the purchase of the plants of the New Castle Tire & Rubber Co. of New Castle, Pa., and the Portage Rubber Co. at Barberton, near Akron.

The Seiberling company did not take over the property of the Portage Rubber Co. until April 1 of last year and did not get into actual production until that time, the sales and profits, therefore, really covering only nine months' operation instead of a full year.

Current Assets Collateral

In its balance sheet for the year the company reports current assets of \$1,810,418 as against current liabilities of \$892,249. Officers state that as collateral to notes payable, aggregating \$450,000, the company has pledged current assets consisting of cash, notes and accounts receivable and finished goods to the amount of \$550,070. The company also has contingent liabilities of \$99,799 on account of notes and trade acceptances receivable discounted.

The outstanding capital stock includes 6835 shares at \$100 each of non-convertible 8 per cent preferred in the Seiberling Rubber Co., 2334 shares at \$100 each of 8 per cent convertible preferred, and 183,310 shares of no par common at \$10 each in the Seiberling Rubber Co. and 8000 shares at \$100 each of 7 per cent preferred in the Portage Rubber Co.

The balance sheet of the company, as of Dec. 31, 1922, shows the following assets and liabilities:

| ASSETS | |
|---|--------------------|
| Land, buildings, machinery and equipment | \$2,635,659 |
| Securities owned | 38,632 |
| Cash | 208,043 |
| Accounts receivable (less reserve for doubtful accounts, \$18,732) .. | 462,519 |
| Notes and acceptances receivable .. | 119,724 |
| Inventories | 1,020,130 |
| Organization expenses (cost of financing and deferred charges to surplus) | 771,735 |
| Patents | 7,614 |
| Prepaid insurance, taxes, rents, &c. .. | 15,674 |
| Total assets | \$5,274,735 |

LIABILITIES

| | |
|--|--------------------|
| Capital stock: | |
| 8 per cent preferred, Seiberling Rubber Co. | \$683,500 |
| Convertible 8 per cent preferred, Seiberling Rubber Co. | 233,400 |
| No par common, Seiberling Rubber Co. | 1,833,100 |
| 7 per cent preferred, Portage Rubber Co. | 800,000 |
| Notes payable | 550,000 |
| Trade acceptances payable | 87,559 |
| Accounts payable | 239,374 |
| Federal excise taxes | 15,314 |
| Deferred credit (claim for excise taxes) | 1,938 |
| Reserves, depreciation molds and cores | 7,500 |
| Reserves, trade discounted | 16,168 |
| Capital surplus | 750,000 |
| Profit and loss surplus | 56,878 |
| Total liabilities | \$5,274,735 |

F. A. Seiberling reported that February sales of the company were on the basis of more than \$7,000,000 a year, being in excess of \$600,000. He also states that the company's statement of sales and profits, covering actual operation during only nine months of last year, covered a period marked by the lowest prices on tires and margins of profit ever known in the history of the tire industry.

The company today paid dividends at the rate of 8 per cent per annum on preferred stock from the date of issue up to April 1, 1922. This dividend was paid to stockholders of record Feb. 28, 1923.

United States Rubber Shows Gain in Profits

NEW YORK, March 12.—Net profits of \$12,662,110 as against \$492,811 in 1921 are reported by the United States Rubber Co. in its annual statement. The difference is explained partly by the heavy reduction in inventory costs. Net sales for 1922 amounted to \$168,786,350, being an increase of \$4,079,729 compared with the sales for 1921.

After payment of fixed charges, net income available for the capital stock in 1922 amounted to \$7,692,038, which, allowing for preferred dividends and dividends on stock of the Canadian subsidiaries, left a balance of \$2,153,320 available for the common stock, which was equal to \$2.65 a share on the \$81,000,000 common capital stock of \$100 a share par value outstanding.

In 1921 the company's profit was equal to 0.72 per cent on the preferred stock, and after payment of regular dividends on these shares and \$1,620,000 on the common stock there was reported a deficit of \$6,585,907.

The consolidated balance sheet on Dec. 31, 1922, showed net current assets of \$120,627,062 and net current liabilities of \$339,144,305, as against \$133,654,675 and \$49,930,957 at the close of 1921.

Miller Turns Deficit Into \$578,890 Surplus

Earnings of Rubber Company Last Year, After Taxes, Reported to Be \$2,756,607

AKRON, March 12.—Profits, before taxes, of \$3,116,607 on total sales of \$26,187,076 are reported by the Miller Rubber Co. of Akron for the fiscal year ending Dec. 31, 1922. This is considered an unusually good showing in view of the fact that tire prices went through a series of reductions during 1922 that approximated over 35 per cent.

The Miller company after payment of taxes reports net earnings of \$2,756,607, the company, during the year, turning a deficit of \$1,290,604 existing on Jan. 1, 1922, into a surplus of \$578,890.

The ratio of current assets to current liabilities is given at more than three to one. Current assets are listed at \$10,585,585 and current liabilities at \$3,146,558.

The company reports discounts of \$1,422,832 from the total sales, leaving net sales of \$24,764,244. Operating expenses for the year were \$21,006,954 leaving an operating profit of \$3,757,289.

Added to the net profit of \$2,756,607 is the sum of \$63,859 representing discounts on preferred stock retired, while deductions are made of charges totaling \$951,576, which includes \$570,458, in dividends paid on preferred stock and \$381,118 in underwriting expenses and other charges.

Accumulated Dividends, \$1,007,445

In the basis of preferred stock outstanding at Dec. 31, 1922, accumulated dividends aggregated \$1,007,445, which amount is reduced by dividends applicable to stock purchased for retirement subsequent to that date. The company charged off \$721,051 during the year for depreciation.

The 1922 net sales of \$24,764,244 compare with net sales of \$18,983,667 for 1921. This increase was accomplished despite the lower revenue received from tires due to price reductions, and necessitated a substantial increase in unit production. Total inventories were built up from \$3,981,922 on Dec. 31, 1921, to \$6,128,074 on Dec. 31, 1922.

The company paid its regular quarterly preferred dividends in September and December last year and at the same times an additional 1 per cent was paid to apply on the deferred dividends. A similar dividend was paid March 1 of this year and the company announces that it expects to continue the payment of regular preferred dividends and the payments on deferred dividends.

FORD PAYS LINCOLN DEBTS IN FULL

Of His Own Volition He Meets Old Claims

Disburses \$4,000,000 to Directors on Notes They Indorsed and to Creditors

DETROIT, March 12—The action of Henry Ford in paying in full the creditors of the former Lincoln Motor Car Co. and also in reimbursing the former directors for money paid by them on notes of the company, personally indorsed, has gained for him the esteem of the whole industry. This commendation is by no means limited to those of the creditors and directors directly affected, but is a general expression of admiration from the industry as a whole.

It was not the approximate \$4,000,000 involved. It was just the knowledge that the payment was made in a fraternal spirit, without a single other consideration.

No word has come from Henry Ford on the matter. None ever will. The years have shown that it is not his custom to explain his motives. Neither will his office give any indication of how his action was received. By the twentieth of the month the checks covering the completed payments will have been returned bearing the indorsement of the payee, which combines an assignment of all claims to Ford. This is the only tangible return.

Letter Sent with Checks

Checks for the remaining 52½ per cent on their accounts were mailed to the more than 900 creditors of the company by Ralph Stone, president of the Detroit Trust Co., receiver for Lincoln. These were signed by Edsel B. Ford as president of the Ford Motor Co. The following letter was sent to each creditor:

When the Ford Motor Co. was considering the purchase of the assets of the Lincoln Motor Co., a Delaware corporation, at the receiver's sale, Mr. Henry Ford indicated that in its organization the successor company should provide for the payment in full of all proper claims against the Delaware company.

Accordingly, you will please find inclosed check for the difference between the amount of your claim as allowed by the Detroit Trust Co., receiver under appointment by the District Court of the United States for the Eastern District of Michigan, and the dividend check which you have already received from the receiver.

On the back of the inclosed check you will notice an assignment of all your claims. When you (if a corporation by your duly authorized corporate officers) have indorsed this check immediately below the assignment, the check will be honored, provided that it is presented for payment on or before March 20, 1923.

N. A. D. A. WILL ISSUE BOOK WITH AD "COPY"

ST. LOUIS, March 13—Publication of the first "copy" in the advertising campaign of the National Automobile Dealers Association will be made April 15.

The "copy" has been made up in books with a schedule of dates for publication. It will be complete, with mats for title lines, cuts, signature lines, etc.

The series of advertisements is directed toward fundamentals of merchandising from the public's angle and some of the practices that the public can avoid by following the suggestions offered.

The seven directors of the company who are reimbursed by the Ford payment are Henry M. Leland, Wilfred C. Leland, W. T. Nash, John Trix, Joseph Boyer, W. H. Murphy and J. H. Emmert. They had paid the difference of 52½ per cent on notes held by the banks, and the personal reimbursement to them totaled in excess of \$2,225,000.

A summary of the complete payments by the receiver from the \$8,000,000 originally paid by Ford shows that the Government received \$2,160,000 in two claims, the first of \$610,000 agreed to prior to the sale, and the last of \$1,550,000 fixed in Federal Court. Preferred claims, taxes, land contracts, etc., took about \$2,300,000 more, leaving about \$3,500,000 for distribution to creditors and note holders whose claims approximated \$6,000,000.

Pierce Position Strong, Forbes Says at Meeting

BUFFALO, March 13—Unprecedented prosperity for the Pierce-Arrow Motor Car Co. for 1923 was predicted by President Myron E. Forbes at a dinner in the Iroquois Hotel, at which distributors representing territory from coast to coast were present.

Forbes declared that the recent permanent refinancing plan has placed the company in an unusually strong position to push its sales and advertising program.

Profits Shown in 1922

BUFFALO, March 14—A pamphlet report issued by the Pierce-Arrow Motor Car Co. for the year ended Dec. 31, 1922, shows manufacturing profits of \$571,991 as against a loss of \$8,254,395 after operating expenses, inventory loss and other deductions in 1921. After payment of fixed charges there remains a net income of \$10,800 in 1922.

Durant Will Embark in Banking Business

Plans to Sell Only One Share of Stock in Proposed Bank to Each Buyer

NEW YORK, March 14—A national bank will be launched within the next four months by Durant Motors, Inc., according to an announcement by W. C. Durant.

The new bank is to be located in New York City, in all probability in the vicinity of Columbus Circle, with a branch downtown. While the name has been selected, it has not been made public. Neither has the identity of the new bank's head been divulged.

Durant is organizing with \$30,000,000 capital, and the stock will be offered under the Durant plan—\$100 a share and with no individual permitted to own more than one share. Officers and directors will receive no recompense for their services.

Durant announces that his banking platform will contain a plank allowing only the legal rate of interest—6 per cent—to be charged. There will be no security company operated in connection with the bank.

Cox Companies Merge; Capitalization \$300,000

ALBANY, N. Y., March 13—The Cox Brass Manufacturing Co., maker of Cox bumpers and other automotive products, has been merged with the Cox Brothers Manufacturing Co., Inc., at a combined capitalization of \$300,000. Hereafter the company will be known as the Cox Brothers Manufacturing Co., continuing the manufacture of bumpers.

No change has been made in the personnel of the company, which has been in business since 1872, establishing a second factory in Cleveland in 1919. The officers are: President, William G. Cox; vice-president and treasurer, Theodore M. Cox; secretary, George E. Way, and directors, John C. Watson and John Cox.

\$635,482 Deficit Shown in Moline Plow Report

MOLINE, ILL., March 17—The first report of the Moline Plow Co. since the reorganization became effective May 6, 1922, covering the first six months of its operation, shows a deficit of \$635,482 after depreciation. Total assets of the company are \$37,231,620 with liabilities of \$37,867,103.

Men of the Industry and What They Are Doing

Gunn Is LaFayette's Chief Engineer

Earl G. Gunn has been appointed chief engineer of the LaFayette Motors Co. of Milwaukee. He has been connected with automotive engineering since his graduation from the University of Michigan in 1904. Gunn's first connection was with the Ford Motor Co., where he designed many of the tools used to make the original Model T. He then did tool engineering on the Cadillac four. In 1909 he served as chief draftsman for Buick, and later became chief engineer at the Northway plant, going from there to Premier as chief engineer in 1915. During the war he was engaged in engineering work on the class B truck. From 1918 to 1920 he was chief passenger car engineer of the Packard company, and since 1920 he has been doing consulting work in Detroit.

Amos Going on World Trip

Frank B. Amos, director of foreign advertising and sales promotion of Dodge Brothers, will leave Detroit on March 25 on a trip that will take him around the world. He will sail from the Pacific Coast and will visit the Dodge Brothers' distributors and dealers in many countries.

P. J. F. Batenburg Resigns

P. J. F. Batenburg has resigned as chief engineer and designer of the Mitchell Motors Co., with which he has been connected for a number of years. Before going with Mitchell he was chief engineer of the Four Wheel Drive Auto Co. of Clintonville, Wis. He has not announced his plans for the future, but expects to remain in the automobile industry.

Zapinske with Yellow Sleeve Engine

Stanley J. Zapinske, assistant secretary of the Samson Tractor Co. of Janesville, Wis., which has liquidated and turned its works over to Chevrolet and Fisher body divisions of General Motors, has become comptroller of the Yellow Sleeve Valve Engine Co., subsidiary of the Yellow Cab Manufacturing Co. Prior to his Janesville connections, Zapinske was associated with the Weston-Mott Axle Co., Timken-Detroit Axle Co. and Northway Motor & Manufacturing Co. He is author of several works on cost accounting and general industrial financial control.

Changes with R & V Motor Co.

Harry R. Nylen has been promoted from the purchasing and stock department of the R & V Motor Co. to the position of purchasing agent, succeeding Henry Dahlquist, who has resigned to become purchasing agent for the Yellow Sleeve Valve Engine Works, Inc. C. H. Lage has been appointed shop super-

intendent for the latter company. He was formerly machine shop foreman for the R & V company.

Samuel A. Miles Sails

Samuel A. Miles, manager of the national shows in New York and Chicago, sailed for England this week, to be gone a month. Upon his return he will take up at once next year's New York Show problem which has changed somewhat since the decision of the N. A. C. C. to hold it in the Eighth Coast Artillery Armory instead of the Grand Central Palace.

Kidder Sales Head for Dunlop

Edward H. Kidder of Boston, former general sales manager of the United States Tire Co. in the New England district, has been appointed general manager of the Dunlop Tire & Rubber Corp.'s sales force.

Madden Heads Syra-Cord Sales

Earl R. Madden, for several years in charge of the Syracuse, N. Y., branch of the Firestone Tire & Rubber Co., has been named director of sales of the reorganized Syra-Cord Tire & Rubber Co., which has started production on a schedule of 150 tires a day.

R. E. Densmore Resigns

R. E. Densmore has resigned as sales manager of the Steel Products Co. after ten years association with that concern. He is now working on sales plans for a business not in the automotive field, in which he has taken a part interest. Previous to his connection with the Cleveland company, Densmore was engaged in technical publication and advertising work.

Davis Joins Smith Bearings

D. D. Davis has joined the L. C. Smith Bearings Co., Chicago, as sales manager in charge of the manufacturing division. Davis was for many years representative in charge of the Middle West territory for the Fafnir Bearing Co., and previous to that served as district manager for the Rhineland Machine Works Co. of New York, importers of ball bearings.

Vis Gear Superintendent

George A. Vis, formerly assistant general superintendent of the Lincoln Motor Co. and later with the Maxwell Motor Corp., has assumed the general superintendency of the new plant of the Automotive Gear Works, Inc., at Richmond, Ind.

Morse Chain Takes on Blackwell

E. E. Blackwell has been added to the sales and engineering force in the automotive field by the Morse Chain Co.

Midgley Given Medal for Research Paper

American Chemical Society Makes Award for Gaseous Detonation Investigation

NEW YORK, March 10—Thomas Midgley, Jr., engineer, Fuel Section of the General Motors Research Corp., was awarded the Nichols medal at a meeting of the New York section of the American Chemical Society, here last night.

This medal is awarded annually for the most meritorious paper covering an original research by the author, published in the Journal of the American Chemical Society during the year. It was first offered in 1902.

Midgley is said to be the youngest recipient of the honor. The medal was given in this case for Midgley's investigations and reports on gaseous detonation, which resulted in the discovery of the so-called anti-knock qualities of numerous substances, the most effective of which is tetra ethyl lead.

The presentation speech, made by Dr. Charles H. Herty, past president of the American Chemical Society, was preceded by a short address by Prof. Wilder D. Bancroft of Cornell University, of which Midgley is a graduate.

Bancroft stated that no really satisfactory hypothesis had yet been advanced to account for the anti-knock properties of various substances which Midgley has investigated. Both Bancroft and Herty paid high tribute to Midgley.

Midgley Divides Credit

In accepting the medal, Midgley stated that much of the credit due for the investigation upon which the award was based is to be given to his colleagues for their part in the investigation work.

He gave it as his belief that all elements have some effect as knock accelerators or deterrents, but as yet anti-knock compounds made from only twenty-two elements have been investigated. The anti-knock property has been found to be a function both of the element and of the group to which it is attached.

Aniline has been taken as the standard on the basis of which the knock deterring or inducing characteristics of other substances are measured. It has been found that all of the important elements used in the manufacture of high explosives have knock-inducing or so-called negative anti-knock properties, Midgley said.

SEAMLESS STEEL PLANT BURNS

MILWAUKEE, March 12—The Seamless Steel Products Co. sustained almost a total loss when fire destroyed its plant.

New Service Motors Takes Assets of Old

Obligations of Company It Succeeds Are Funded Over
Long Period

CHICAGO, March 13—Organization of a new company to take over and operate the Service Motor Truck Co., at Wabash, Ind., has been completed along the lines which have been under way for several months.

The new company is known as Service Motors, Inc., and is capitalized at \$600,000, all the stock being owned by the old corporation. The method of organization was adopted to provide the operating company with credit and working capital to carry on the business properly and to fill the company's orders for trucks and gasoline railway cars.

Obligations of the old company, which might have proved a deterrent to the conduct of new business, are, by the organization, no longer direct obligations of the new company, but are funded over a long period.

The company starts with substantial assets of \$19,511 cash, \$150,405 receivables, \$750,000 inventory, \$275,399 surplus, \$75,000 pledged assets and \$150,000 contingent reserves.

Paul Moore, formerly sales manager of the company, has been elected president of the company. The other officers are: Vice-presidents, C. W. Folds, Charles Guernsey and G. L. Gillam, and secretary-treasurer, E. L. Mock. The directorate includes these officers and a number of Chicago and St. Louis bankers.

Piston Manufacturers Complete Organization

DETROIT, March 14—The National Association of Piston Manufacturers, formed during the New York show, perfected its organization, elected officers and adopted a constitution and bylaws at a meeting in Detroit this week. The purpose of the organization is to promote the interests of manufacturers of automotive pistons and to bring members together on questions affecting this branch of the industry.

Chester J. Sparks of the American Piston & Machinery Co. is the president of the association; Oskar Kylin, Foster-Johnson-Reamer Co., vice-president; N. W. Durnin, Houpert Machine Co., secretary, and T. A. Seitz, Detroit Auto Piston Co., treasurer. These, with Henry Burnham of the Ohio Piston Co., constitute the executive board.

Companies represented at the meeting and affiliated with the association, in addition to the above, were the Spencer Smith Machine Co., Dalt Motor Parts Co., Wisconsin Machine and Manufacturing Co., Muskegon Motor Specialties Co., American Machine Products Co., Wright Manufacturing Co., Kantskore

Piston Co., Clark-Turner Piston Co., Willis Piston Co., Sidney McLouth Co. and B. Miller Foundry and Machine Co. The association will meet twice annually, in January during National Show season and in July. The headquarters of the association are in Detroit.

New Increase in Prices

Made by Tire Producers

(Continued from page 636)

for still higher wages.

Even with a 10 per cent increase tacked on to that enforced the first of the year, tire prices will be far below standard, according to manufacturers, who admit that in their price slashing war a year and two years ago they were over-zealous and unnecessarily cut prices too much at those times.

Kelly-Springfield to Advance

NEW YORK, March 14—Undoubtedly the action of the United States Tire Co. in advancing the price of tires will be followed by other manufacturers in this section. Officials of the Kelly-Springfield Tire Co. said today that they would bring out a new list within a few days, which would show advances of from 10 to 12 per cent. Another expected to advance is Fisk, while it is said that, without exception, all others in this territory would do likewise.

Standard Truck Prices

Now \$95 to \$495 Higher

DETROIT, March 8—Increases in prices ranging from \$95 to \$495 and affecting practically its entire line of models have been announced by the Standard Motor Truck Co. The revised prices are as follows:

| Model | Old Price | New Price |
|----------------|-----------|-----------|
| K 1½-ton..... | \$1,600 | \$1,695 |
| K 2½-ton..... | 2,400 | 2,795 |
| KS 2½-ton..... | | 2,875 |
| K 3½-ton..... | 3,150 | 3,645 |
| KS 3½-ton..... | | 3,725 |
| K 5-ton..... | 4,400 | 4,495 |

The model 75 1¼-ton remains unchanged at \$1,330.

Ruggles Increases List and Adds Two New Models

SAGINAW, MICH., March 10—The Ruggles Motor Truck Co. has announced a revision in its prices and the addition of two new models. An increase of \$100 has been made on the 1¼-ton model and \$200 on the 2-ton truck. The price of the new "Go-Getter" ¾-ton model, recently announced, is \$795. The following are the new prices and models.

| Model | Old Price | New Price |
|------------------|-----------|-----------|
| 15 ¾-ton..... | | \$795 |
| 20R 1¼-ton..... | \$1,195 | 1,295 |
| 20AR 1¼-ton..... | New Model | 1,395 |
| 40 2-ton..... | 1,795 | 1,995 |
| 40H 2½-ton..... | New Model | 2,195 |

Mack Trucks Earned \$9.94 Share in 1922

Gross Sales Reached \$31,070,289
and Net Profits Amounted
to \$3,952,279

NEW YORK, March 14—Gross sales of \$31,070,289 for the year ended Dec. 31, 1922, as against \$24,849,268 in 1921, are reported by Mack Trucks, Inc., in its annual statement. After the usual deductions, net profits showed \$3,952,279, which, after allowing for regular dividends on the preferred, left a balance equal to \$9.94 a share on the 283,108 shares of common of no par value outstanding.

After similar deductions and including inventory deductions, the net profits of 1921 were equal to \$1.16 a share on the 109,219 shares of first preferred stock outstanding. There remained a surplus of \$2,532,554 after payment of both common and preferred dividends last year, thus increasing the company's earned surplus to \$5,767,799 as against \$3,235,245 at the close of 1921.

The balance sheet as of Dec. 31, 1922, showed net current assets of \$23,048,700 as against \$18,537,686 at the close of 1921. Net current liabilities amounted to \$2,499,129 contrasted to \$1,275,668.

Current assets include \$4,231,044 cash and \$6,245,230 accounts and notes receivable, less reserves and inventories valued at \$23,048,700. Among the current liabilities are \$1,831,215 accounts payable, \$612,257, accrued accounts and \$55,656 customers' deposits.

Bowers Current Assets Amount to \$507,082

DETROIT, March 13—Total assets of the Bower Roller Bearing Co. were \$824,360, as of Dec. 31, 1922, compared with \$822,480 in 1921. According to the annual report, current assets of \$507,082 represent an increase from \$487,285 a year ago and surplus of \$25,270.49 compared with a deficit of \$11,067 at the close of 1921.

Current assets include \$100,000 United States Certificates of Indebtedness, an increase from \$25,000 in 1921. Cash totals, \$3,893, compared with \$35,917. Receivables total \$86,526 against \$92,972, and inventories are appraised at \$313,823 as compared with \$329,730.

Plant investment shows land valued at \$20,000, with buildings, machinery, tools and equipment appraised at \$241,771 after writing off \$189,198 for depreciation reserve. Value of land and plant investment in 1921 was shown as \$273,286. Value of patents less depreciation is shown as \$44,159. Deferred charges total \$11,346, as against \$13,260 the previous year.

Authorized capital stock was increased from \$600,000 to \$800,000 during the year, and the amount outstanding from \$600,000 to \$799,080. Par value is \$10.

Rubber Association Will Assist Hoover

Names Committee to Serve in Advisory Capacity in Proposed Research

(Continued from page 636)

Directors of the Rubber Association have approved the following recommendations to the committee which recently visited the United States from the Rubber Growers' Association:

1. That the Stevenson plan for the restriction of crude rubber exports from the British dominions be abolished in its entirety, this recommendation being predicated upon the firm belief that the natural conditions of supply and demand now existing will fully protect the plantation industry.

2. A request for immediate consideration by the Colonial Government's advisory committee, of which Sir James Stevenson is the head, of the announcement by the British Colonial or the local colonial governments that it use its discretionary powers with respect to the application of this scheme and release rubber without regard to quarterly periods or prices if necessary to prevent wild fluctuations as part of the speculative movement.

Interesting in this connection is the cabled interview with Winston Churchill, who says that England is under no obligation to supply the United States with rubber below the cost of production and that he believes United States consumers will not be injured by the measures taken to secure a staple price for rubber at levels which will enable the industry to exist.

He thinks that stabilization at two shillings a pound would afford a perfectly satisfactory basis for American manufacturers and would be preferable to the violent fluctuations which otherwise would have followed on the bankruptcy of the producers and the collapse of so many plantations.

O'Neil of General Opposes Plan

AKRON, March 12—William O'Neil, vice-president and general manager of the General Tire & Rubber Co. of Akron, a director of the Rubber Association of America and a member of the special commission named by that association to confer with the commission representing the Rubber Growers' Association of Great Britain on its recent visit to the United States, charged here today that proposed expenditure of \$500,000, as authorized by the Government for investigating the possible development of rubber plantations in the Philippine Islands, would constitute a mere waste of that much of the people's money.

O'Neil expressed himself as diametrically opposed to the Firestone plan and declared that his company would not join any movement to encourage the importation of hordes of ten-cent-a-day Chinese, Javanese or Malayan coolie labor into the Philippines or Brazil.

He said:

BRITISH INCREASE SOLID TIRE PRICES

WASHINGTON, March 12 — Cable dispatches from Commercial Attaché Tower of London advise the Department of Commerce here that the retail prices of solid tires have been advanced 10 per cent by British manufacturers.

No changes have been made in the retail price of pneumatic tires.

One company has circularized the trade, offering discounts of 32½ per cent and 7½ per cent on fabric tires to clear stocks and permit the concentration on cord tires.

Much as every American would like to see the production of crude rubber dominated by America, and all the rubber necessary for American use grown under the American flag, the fact remains that it is not practical as an economic proposition. The subject has long since been investigated very carefully and thoroughly, and the results are available in dozens of responsible places, so that the decision of the government to spend \$500,000 for "investigation" means a plain waste of the people's money.

There is an overproduction of crude rubber at the present time, and development of an American enterprise for rubber growing, as proposed, would only make an unprofitable industry more so.

Midwest to Discuss Question

CHICAGO, March 13—Two subjects of importance to the automobile tire industry are on the program for discussion at the March meeting of the Midwest Rubber Manufacturers Association, which will be held March 20 at the Hotel Cleveland, Cleveland. B. M. Robertson of the Firestone Tire & Rubber Co. will talk on "The Crude Rubber Situation," and Edward S. Babcox, editor of *The India Rubber Review*, will talk on "Can the Small Manufacturer Survive?" There will be an open forum discussion of these and other topics by the members.

10,794 Stars Produced by Durant in February

NEW YORK, March 12—Durant Motors reports that on March 1 a total of 31,646 Star cars had been produced in the three months the various factories have been turning out this line. The February count was 10,794, while March is expected to produce 15,000. In April the schedule calls for 20,000. The red letter day in production so far was Feb. 23, when 852 were manufactured, while on Feb. 28 a shipping record was broken with 912 sent out to distributors. It is expected production will reach 1000 a day within the next three weeks.

Equipment is being installed in the new Flint plant and it is expected it will take sixty days to complete the job. Production on the new Princeton car, which will be turned out from the Muncie plant, is expected to start in about ninety days.

Reeves Meets Hoover on Rubber Situation

Confer on Effects of Proposed Inquiry—Government Selecting Staff of Experts

WASHINGTON, March 13—Alfred Reeves, general manager of the National Automobile Chamber of Commerce conferred with Secretary of Commerce Hoover today regarding the rubber situation. They discussed the effect of the rubber inquiry on the automobile industry. Reeves submitted figures to Secretary Hoover as to the increasing volume of production of motor vehicles.

With an appropriation of \$500,000 available for immediate investigation of the rubber situation, the Department of Commerce in conjunction with the Department of Agriculture is now selecting a special staff of experts to conduct the inquiry. These committees will cooperate with a special committee representing the rubber manufacturers and consumers. It is expected that Harvey S. Firestone will name his committee this week.

Scientists from the Department of Agriculture will experiment with rubber growing in the Philippines and other insular possessions as well as in the continental United States. The Department of Commerce experts will conduct an inquiry into production and labor. In addition, the special committee representing the industry will cooperate with the Government in negotiating with the British authorities for the repeal of the restrictive rubber production laws.

Receiver of Republic Rubber to Sell Plants

(Continued from page 640)

YOUNGSTOWN, OHIO, March 13—C. H. Booth, receiver for the Republic Rubber Co., in announcing plans for the reorganization of the concern, has notified stockholders that it is planned to authorize \$2,000,000 of twenty year 7 per cent bonds, \$4,000,000 of ten year 7 per cent debentures and 50,000 shares of no par value common stock.

The program involves issuance of all the bonds, \$2,000,000 of debentures and 41,000 shares of common. Stockholders will have the opportunity of buying for \$100 a bond for that amount and one share of common, or for \$250 a bond of no par value of \$100 and \$178.50 in debentures and two shares of common.

Should the stockholders' cash subscriptions total less than \$1,100,000, the reorganization committee reserves the right to reject all subscriptions. Rights to subscribe expire April 1. The bonds will be used to pay the obligations incurred by the receiver for the property, while the debentures will be taken by creditors in settlement of claims they have.

Railways Have Plan for Motor Equipment

Corporation Organized by Short Lines for the Financing of Purchases

WASHINGTON, March 14—Formation of the Railway Motor Finance Corp. for the purpose of assisting member lines of the American Railway Association and others in the purchase and operation of railway passenger and express motor car equipment, was announced today by J. W. Cain, president.

It was found necessary to organize a corporation through which motor car requirements of a large number of lines could be combined and handled through consolidated trusts of sufficient amounts to keep the cost of financing within reasonable limits. The corporation has been organized under the laws of Illinois.

More Cars This Year

In telling of the plans, Cain says:

Upon completion of the preliminary investigation concluded March a year ago, a recommendatory circular letter was issued to all member lines. Notwithstanding the unsettled conditions due to the railroad and coal strikes, there were some twenty-five or more motor cars put in service on the short lines last year. From definite inquiries, and as the result of personal solicitation, it is conservatively estimated that from 75 to 100 cars will be added during the current year.

It was found that many lines were operating motor cars at from 10 cents to 25 cents per mile, including all charges, as compared with a cost of from 65 cents to \$1 per train mile in the operation of steam trains. The extremely low cost of 10 cents per mile covered operation of the smaller cars, seating from 20 to 25 passengers and operated by one man. The larger cars, seating 45 to 50 passengers, and carrying baggage, are operated by two men, and the average cost, including all charges, is 25 cents per mile.

The investigation was augmented with answers to questionnaires sent the entire membership of the American Short Line Railroad Association, comprising more than 500 different railroad companies with a combined mileage of about 30,000.

With this information in hand, it was concluded that self-propelled motor cars, when built by a reputable manufacturer and incorporating power units proved through years of service, should be as good collateral as any class of railroad or interurban equipment, and efforts were thereupon inaugurated whereby motor cars could be financed on a car trust basis.

25 Per Cent Cash Payment

Since the total outlay for motor car equipment for the individual road is, for the time being, insufficient to justify an individual car trust, it was necessary to organize a corporation through which the motor car requirements of a large number of lines could be combined and handled through consolidated trusts of sufficient amounts to keep the cost of financing within reasonable limits.

On this basis prospective purchasers of motor car equipment may finance their needs on a lease purchase basis, paying approximately 25 per cent cash and the bal-

ance over a maximum period of four years. Likewise the equipment can be paid for out of earnings, and in a great many cases, there will be a comfortable margin to spare.

The Railway Motor Finance Corp. has selected the following officers and directors:

President, J. W. Cain, manager of the A. S. L. R. R. Association; vice-president, L. S. Cass, president, Waterloo, Cedar Falls & Northern Railway; vice-president, A. C. Moore, vice-president, Chicago Railway Equipment Co. and A. M. Fornwald, secretary. Directors, Bird M. Robinson, president, A. S. L. R. R. Association; L. S. Cass; Ben B. Cain, vice-president and general counsel, A. S. L. R. R. Association; T. F. Whittelsey, secretary and treasurer, A. S. L. R. R. Association; J. W. Cain, A. C. Moore and F. J. Linsman & Co.

The principal offices of the corporation will be located in the Railway Exchange, Chicago.

M. A. M. A. Committee Meets Commerce Officials

WASHINGTON, March 14—The recently formed foreign trade committee of the Motor and Accessory Manufacturers Association met here today with officials of the Bureau of Foreign and Domestic Commerce concerning the work of the automotive division of the bureau in promoting the export sale of American made equipment.

Conferences were held with Dr. Jul us Klein, director of the bureau; Dr. Thomas Taylor, assistant director; M. H. Hoeppli, acting chief of the automotive division, and other officials. Members of the committee here today were S. W. Dorman, chairman; J. F. Kelly, Jr., W. F. Earls and M. Lincoln Shuster.

U. S. Chamber to Discuss Transportation in May

NEW YORK, March 14—"Transportation in All Its Phases in the United States" will be one of the two major topics considered at the eleventh annual meeting of the Chamber of Commerce of the United States, which will be held in this city May 7-10.

Tire Producers Join Export Association

WASHINGTON, March 14—Several tire manufacturers have joined the Rubber Export Association of New York City, which filed papers with the Federal Trade Commission today under the Webb-Pomerene law, which permits the formation of export trade associations solely for the promotion of export trade and exempts them from the operation of the anti-trust laws.

The members of the association are the United States Rubber Export Co., Ltd., New York; Goodyear Tire & Rubber Export Co., Akron; and Miller Rubber Export Co., New York. Directors of the association include A. M. Cameron, Akron; E. H. Huxley, New York, and R. R. Byrne, Akron. J. B. Tower of New York is secretary.

Discount to Jobbers Proper, Court Holds

Appeals Judges Say Mennen Co. May Give Allowance for Special Service

NEW YORK, March 14—The United States Court of Appeals has handed down a decision in the test case brought by the Mennen Co. against the Federal Trade Commission.

Judge Henry Wade Rogers wrote the decision, which, as interpreted by the lawyers, holds that the Mennen Co. may sell its products to the wholesalers at one price and to retailers at a relatively higher price, making a discount to the wholesalers for service rendered. It is further decided that the Mennen Co. is in no sense a monopoly, and that it might even refuse to sell to retailers if it so desired. In part the court said:

What the Mennen Co. did was to allow to wholesalers who purchased a fixed quantity of their products a certain rate of discounts, while to the retailers who purchased the same quantities it denied the discount rates allowed to the wholesalers. This does not indicate any purpose on the part of the Mennen Co. to create or maintain a monopoly.

The company is engaged in an entirely private business and it has a right to freely exercise its own independent discretion as to whether it shall sell wholesalers only or whether it shall sell to both wholesalers and retailers, and if it decides to sell to both it has a right to determine whether or not it shall sell to the retailers on the same terms it sells to the wholesalers. It may announce in advance the circumstances, that is, the terms under which it will sell or refuse to sell.

Denial of \$1 Gasoline, Ruse, Says La Follette

WASHINGTON, March 13—Senator La Follette, replying to the statements issued by Standard Oil Co. executives, today declared that millions of automobile owners throughout the country will demand immediate action by the next Congress to prevent exorbitant increases in gasoline prices.

He said that the prospect of using alcohol for the present high priced motor fuel holds no comfort to the automobile owners unless Standard Oil is prevented from monopolizing the process of manufacture. The senator said that statements from Standard Oil officials denying the possibilities of dollar a gallon gasoline was a ruse to fool the public.

SERVICE EQUIPMENT MEETING

DETROIT, March 12—Wider distribution of automotive equipment and methods of reducing sales costs will be the chief topics of discussion at the meeting of the Service Equipment Association in this city on March 22. B. G. Koether, E. M. Young and Frank G. Eastman of the General Motors Corp., David Beecroft and Clyde Jennings of The Class Journal Co., will be the speakers.

FINANCIAL NOTES

Electric Storage Battery Co. reports a net income of \$7,570,838 after expenses and charges and before Federal taxes, the latter being estimated at \$885,000. The balance is equal to \$8.37 a share earned on 797,877 shares of no par capital stock. This compares with a net income of \$5,602,283 in 1921. Gross sales in 1922 amounted to \$11,966,681 as against \$10,015,812. The company's consolidated balance sheet shows cash \$2,485,474 compared with \$2,519,699; accounts and notes receivable, \$5,507,408 in contrast to \$3,997,543; inventories, \$404,956 in comparison with \$466,982; accounts and notes payable, \$2,662,598 as against \$1,184,533; and surplus, \$21,957,765 in comparison with \$19,041,211.

United States Motor Truck Co. consolidated balance sheet as of Dec. 31, 1922, shows current assets of \$1,310,954 and current liabilities of \$127,480. Assets include cash of \$119,024; Liberty bonds, \$7,388; accounts receivable, \$293,296; stock and investments in other companies, \$15,674, and inventories at market value, \$766,990. Liabilities include \$1,213, accounts payable and \$126,267, notes payable.

Rickenbacker Motor Co. has declared a 2 per cent cash dividend, which President B. F. Everitt declares is justified by and payable from profits in the first quarter of the year. In January the company paid a 5 per cent cash dividend from earnings in 1922. In its first full twelve months of operation the company earned \$1.15 a share on its \$10 par value stock, or at the rate of 13 per cent.

Parish & Bingham Corp. had net sales of \$4,707,601 for the year ended Dec. 31, 1922, according to the annual report. Net operating profits were \$200,314 and the net profit for the year, after interest and other special charges, amounted to \$3,213. The profit and loss surplus on Dec. 31 amounted to \$1,843,186.

Gray & Davis, Inc., in its 1922 report shows an operating profit of \$200,021 against an operating loss of \$179,594 in 1921. After allowing for dividends on the preferred stock the balance of \$268,332 available for the 136,946 shares of common was equal to \$1.96 a share.

Pyrene Manufacturing Co. in its annual report shows a profit of \$123,224, subject to Federal taxes, as compared with \$48,285 in 1921. After the payment of dividends amounting to \$146,316, there was a deficit of \$23,092, against \$98,031 the previous year.

Badger Foundry Co. of Racine, Wis., has increased its capital stock, which now consists of \$100,000 preferred and 1000 shares of common stock without par value, the equivalent of \$100,000, however.

Spicer Manufacturing Co. has declared the regular quarterly dividend of 2 per cent on the 8 per cent preferred stock, payable April 1 to holders of record March 21.

Kelsey Wheel Co. has declared the regular quarterly dividend of 1½ per cent on the common stock, payable April 2 to stock of record March 20.

Bassick-Alemite Corp. has declared an initial dividend of 50 cents a share, payable April 1 to stock of record March 20.

TO DRAFT CODE ON COLORS

NEW YORK, March 12—Forty-two members have been named by the American Engineering Standards Committee for its Sectional Committee for Code on

Colors and Traffic Signals. The automotive industry is directly represented by six members. These automotive representatives are: David Beecroft, American Automobile Association; M. L. Hemmings, Motor and Accessory Manufacturers' Association; T. D. Pratt, Motor Truck Association of America; Harry Meixall, Jr., Motor Vehicle Conference Committee; Pyke Johnson, National Automobile Chamber of Commerce, and W. A. McKay, Society of Automotive Engineers.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Growing business activity and credit expansion are shown by the 16 per cent increase in bank debits reported from 239 centers for the week ending March 7. The week's total increased to \$10,897,000,000 from \$9,389,000,000 of the previous week and \$8,463,723,000 of the corresponding week last year. The amount of bills discounted by the Federal Reserve has decreased during the last two weeks, although the volume of loans and discounts of member banks increased \$107,000,000 and loans secured by corporate obligations increased \$62,000,000. The reserve ratio remained unchanged at 76.2 per cent. Gold reserves increased \$10,600,000 and note circulation, \$9,400,000.

Interest rates in general for the last week were slightly firmer, call loans showing no change at 4½ to 5½ per cent, but time money from sixty days to six months advanced from 5 to 5½ per cent, as compared with 4½ to 5½ per cent the week before. The Federal Reserve Bank of San Francisco raised its rediscount rate to 4½ per cent last week. All Federal Reserve banks are now on a uniform rediscount rate basis of 4½ per cent.

There were fewer business failures during February than in any month since September, 1921. The number of insolvencies was 25 per cent less than in January and may be regarded as a sign of improving business conditions.

There are many indications of a growing volume of business. Some of these are larger steel and iron outputs and increasing imports. The latest reported railroad car loadings continue to set new records. For the last month the weekly loadings have averaged over 840,000 cars, which is more than 50,000 cars a week above any other February for the last four years.

TRADE BODY COOPERATION

WASHINGTON, March 13—Methods of arranging closer cooperation between trade associations and the Chamber of Commerce of the United States were discussed here today at a conference with the advisory committee of the National Association of Trade Association Executives. Alfred Reeves, general manager of the N. A. C. C., is a member of the committee.

French Grand Prix Race Has 17 Entries

Poppet and Sleeve Valve Engine Competition Will Be Feature of July Race

PARIS, March 1 (by mail)—When the entry list for the French Grand Prix 500-mile road race for 122 cu. in. cars was definitely closed last night, 17 cars had been inscribed. The makes are Rolland-Pilain 3, Sunbeam 3, Fiat 3, Voisin 4, Bugatti 3, and Delage 1. This race will be held on a short triangular course near the town of Tours, 120 miles to the southwest of Paris, on July 2, and will be preceded by another race on a fuel consumption basis.

Few of the drivers have been appointed for the French classic. The Rolland-Pilain team will have Albert Guyot as its captain, with Victor Hemery as his companion, and probably also Jules Goux. For Sunbeam, only K. Lee Guinness and Segrave have been appointed.

The Fiat team will have Pietro Bordino at its head, but no information has been given out regarding the two other drivers. Gabriel Voisin has caused consternation in racing circles by announcing that no candidate weighing more than 130 pounds will be accepted for his sedan racers. Pierre De Vizcaya will handle one of the Bugattis, but he does not know who his companions will be. René Thomas will be at the wheel of the Delage.

Technical features of this year's French Grand Prix race will undoubtedly be the competition between poppet and sleeve valve engines, the use of superchargers, and the very close attention given to streamlining. Bench tests are being carried out by some of the makers with systems for feeding the gas into the cylinders at higher than atmospheric pressure. Using these devices it has been possible to get considerably more than 100 hp. out of 122 cu. in. engines running on the bench, but the device being somewhat complicated it remains to be seen what the results will be on the road. The best results without a supercharger were 95 hp.

Multi-cylinder engines will dominate: Rolland-Pilain, Fiat and Bugatti have each eight cylinders; Sunbeam and Voisin have six-cylinder engines, and Delage is using a four. As last year, the competitors will follow track practice and run without a spare wheel, thus keeping weight down and helping to improve the streamlining of the cars.

CHECKERED HAS PLANT OPTION

NEW YORK, March 14—The Checkered Cab Co., which has made extensive plans for the manufacture of taxicabs, has secured an option on a big automobile manufacturing plant in Wisconsin. Details of the deal are not ready as yet for announcement.

Archer Back Hopeful from South America

Willys Export Manager Says That
Sales Should Increase There
This Year

TOLEDO, March 14—That South American conditions as a whole are not healthy at present, but that exports of automobiles to that continent will be increased this year over last, and that there are some hopeful signs for the future, is, in brief, the opinion of R. J. Archer, vice-president and general manager of the John Willys Export Corp., after an extended trip, which included visits to four islands of the West Indies, Venezuela, Brazil, Argentina, China, Peru, Ecuador and Panama.

Depreciated exchange, shorter crops, the falling off of export demand for agricultural products and the status of good roads all are more or less "bearish" factors in the automobile business in South America, he declares.

East Coast Stocks Sold

Speaking of conditions, Archer said:

Our shipments to South America this year will show an increase over last year.

The old stocks on the East Coast have been sold, but on the West Coast there are still a few medium and high priced cars in stock.

The realization that the truck and passenger car play a big part in national transportation has brought forth some demand for revision of the tariffs downward, which will be entirely favorable to the automobile industry.

The roads problem presents many complex angles. In the cities there are fine streets and roads, but no main highway connecting links as we know them. The roads outside cities are poor. In some of the countries where State railways are operated there has been some pressure against road construction because of its competition with the government-owned transport system.

There is some work on road improvement going forward on the East Coast, but there is much to be done in that way.

Farm Products Sale a Factor

Archer said that the falling off in foreign demand for agricultural products probably was the leading factor in conditions in South American countries. In regard to this phase, he said:

The short wheat crop in the Argentine and the decreased demand for cattle in the world markets have not been conducive to bringing in much overseas money.

Brazilian exchange is depreciated as much as that of Chile; yet the people of Brazil are able to buy automobiles, while in Chile they do not have the money, because the demand for nitrates, which furnish about 80 per cent of the export business of the country, has fallen to exceedingly low marks. Exchange undoubtedly will improve as general world conditions approach the normal.

A tendency toward manufacturing in Brazil was noted by Archer. Batteries, some accessories, and tires have been among the products attempted there. The tire production tried so far has been

unsuccessful. There is little prospect of a development of general manufacturing on such a scale that automobiles will be built in South American countries, he says.

There is a smattering of European competition, Archer states, but no real competition due to American progress in manufacturing and lower prices of the cars made in this country.

Some public financing has helped to aggravate the general business conditions and credit in some of the South American States.

Archer found that automobile dealers and distributors on the east coast were making some progress, but that on the west coast "not all is happy." Many of the larger firms which made profits out of the automobile business during the boom days in the west coast cities are still holding on, hoping some sort of revival will come, while there is slight indication of better times for them. A majority of them are not making enough at present to maintain their overhead.

INDUSTRIAL NOTES

Charles R. Talbot was elected president of the Motors Metal Manufacturing Co. at the annual meeting. H. A. Burnett was chosen vice-president, William Christian treasurer and general manager and Robert McMath secretary and assistant manager. The officers and Willard Pope, George Roehm, George G. Harris, R. C. McMath and L. N. Allen compose the new board of directors.

American Metal Products Co., Milwaukee, manufacturing Ampco metal, a copper-aluminum-steel alloy of high tensile strength and acid-resisting, voted at the annual meeting to greatly enlarge its scope to handle increased business from the automotive and other industries. Its volume in 1922 was 400 per cent over that of 1921.

Wright Aeronautical Corp., heretofore manufacturing only airplane engines, will enlarge its activities by producing aircraft. The present plant at Paterson, N. J., will be increased by the erection of a large factory for the building of planes. A flying field, hangars and equipment will be provided.

Theodore L. Dodd & Co., 80 East Jackson Boulevard, Chicago, with a branch office in the General Motors Building, Detroit, has been appointed Western sales representative of the Titusville Forge Co. of Titusville, Pa.

SHARON STEEL PLANT TO CLOSE

PITTSBURGH, March 12 — Judge Thompson in the United States District Court has ordered the receivers for the Sharon Pressed Steel Co. to close the works at once, thus throwing 400 men working on automobile parts out of employment. At the time the receivers were appointed, Feb. 26, the company reported that it had unfilled orders valued at more than \$750,000.

FRANKLIN MAKES 60 DAILY

SYRACUSE, March 13—The H. H. Franklin Manufacturing Co. is now producing sixty cars a day.

METAL MARKETS

Conditions in the sheet market are indicative of the different shades of opinion prevalent among steel producers and consumers. The Corporation's sheet-rolling subsidiary continues to maintain as its nominal quotation for automobile sheets a level \$7 a ton below that at which this class of sheets can be actually purchased today. Irrelevant as the quotation of a producer may be, when this producer has nothing to sell, the Corporation's quotation does have a certain amount of significance after all. With the year's second quarter drawing near—the quarter for which the Corporation's sheet capacity is booked to the limit—the problem of opening books for third quarter orders also approaches.

While it is not only possible, but highly probable, unless an entirely unforeseen change in market conditions should take place in the next few weeks, that the Corporation will revise its sheet prices upward to bring them more nearly in line with those now obtained by the independents, it would be inconsistent with the chief interest's price policy to permit the total disappearance of the differential that now distinguishes its nominal quotations from actual steel market prices once these nominal quotations give way to levels at which third quarter business can be placed.

Taking into consideration that sheet bars bring \$45, the base price for full-finished automobile sheets is more than reasonable. These mills that are now booking second quarter business at 5.35 cents approach the market from the manufacturing point of view. They might get a few dollars per ton more on May-June business if they restricted their bookings to April shipments, but they prefer to have a backlog of orders that will permit of a rational arrangement of operating schedules. Then there are the producers who confine their bookings to shipments within four to six weeks. Most of these are non-integrated in the matter of sheet bar supply, and they are uneasy over how they will fare in the matter of prices on future sheet bar contracts. They are equally uneasy about the midsummer supply of labor and freight cars. Many of this class of producers, moreover, make it a point to have their commitments in such shape as to permit their taking the greatest possible advantage of sudden advances in a market like the present one.

Some of the latter, now fully awakened to the tight conditions of the steel supply, are seeking to do what they should have done four months ago—protect themselves against further advances by anticipating their requirements. Of these a few have grown sufficiently heedless of the future to seek acceptance by a number of mills of orders sufficient to cover their normal requirements many times over, trusting to luck that they will either be able to use the steel in some mysterious manner, or that they will be able to get away with cancellations of the surplus. Producers are guarding especially against such business.

Pig Iron.—With the foundry iron market on a \$30 basis, automotive foundries are not disposed to cover further ahead than their own obligations necessitate.

Aluminum.—The market is quiet and firm, with no increase in offerings of imported metal. Greater consumption is reflected in the resumption of bauxite mining at the leading deposit in British Guiana.

Copper.—Consuming demand has abated somewhat. Predictions of higher prices following the recent slight reaction continue.

Calendar

SHOWS

May 13-20 — New York, Spring Salon, Hotel Commodore.
Nov. 4-10 — New York, First Automobile Salon of the Foreign Automotive Association, Hotel Astor.

FOREIGN SHOWS

March 31-April 29 — Madrid, Spain, International Automobile Exposition at the Palacio de Exposiciones, showing automobiles, motorcycles, accessories and equipment, under the auspices of the Chambre Syndicale de l'Automobile et du Cycle.
May 9-June 12 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.
Oct. 4-14 — Paris, Passenger Cars, Bicycles, Motorcycles and Accessories, Grand Palais.
Oct. 24-Nov. 2 — Paris, Trucks, Agricultural Tractors, etc., Grand Palais.

RACES

May 10 — Berlin - Grunewald, German Grand Prix.
May 30 — Indianapolis, Eleventh Annual 500-mile International Sweepstakes.
July 2 — Tours, French Grand Prix 500-mile race.

CONVENTIONS

May 2, 3, 4 — New Orleans, Annual Convention of the National Foreign Trade Council.
May 7-10 — New York, Annual Convention of the United States Chamber of Commerce.
May 7-12 — Seville, Spain, Fourth International Highway Congress.
Oct. 24-26 — Cleveland, Thirtieth Annual Convention of the National Association of Farm Equipment Manufacturers, Hotel Statler.

S. A. E. MEETINGS

Metropolitan Section
April 19 — Speaker, Edw. E. La Schum, General Superin-

tendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17 — Speaker, F. P. Gilligan, Secretary, Henry Southern Engineering Co., Subject, Metallic Materials for Automotive Work.

Other S. A. E. Meetings

March 16 — Meeting of S.A.E. at Cleveland — Speaker, Col. G. A. Guthrie; Rooms of the Cleveland Engineering Society, Hotel Winton, 8 p.m.

March 16 — New England Section — Speaker, Harry Tipper; Subject, Economic Phase of the Automotive Industry to be followed by a film on electrical starting, lighting and ignition; Engineers' Club, Boston; Dinner 6.30 p.m.; Meeting 8 p.m.

March 23 — Mid-West Section — Speaker, F. H. Ford; Subject, Road Lighting;

Western Society of Engineers; Meeting 7 p.m.

Buffalo Section — Speaker, Edward Schipper; Subject, Impressions of New York and Chicago Shows; Hotel Iroquois at 8 p.m.

Pennsylvania Section — Will Not Meet in March.

June 19-23 — Summer Meeting of the S. A. E. — Spring Lake, N. J.

October — Production Meeting of the S. A. E. — Cleveland.

MEETINGS

June 14-15 — Bethlehem, Pa., Eastern Sectional Meeting of the American Society for Steel Treating, Hotel Reservations made through George C. Lilly, Superintendent of Heat Treatment, Bethlehem Steel Co., Bethlehem.

June 25-July 1 — Dixville Notch, N. H., Summer Meeting of the Automotive Equipment Association.

Sales of Tractors Gain in Southeast

ATLANTA, March 14 — Definite figures on farm implement and tractor sales by six of the larger distributors of the Southeast, most of them located in Atlanta, show a remarkable improvement in January as compared with the same month in 1922, a compilation of the six reports showing an increased sales volume of 96.9 per cent.

Sales were about on a par with December, which month showed an increase of 39 per cent over November, as compiled from the records of the six firms referred to. Definite figures for February or March are not available, but all six of the companies report they will at least be on a par with January, and approximately 100 per cent better than the same months in 1922.

There has been a steady increase from month to month in tractor and power farming machinery sales in the Southeast since last September, with the exception of January over December which was about even. The outlook for the spring trade indicates the biggest volume of business in the history of the industry in this section, due largely to the fact that cotton prices have reached 31 cents per pound, and that indications give promise of the largest cotton acreage in the South in a decade.

AUSTRALIAN DEALER HERE

INDIANAPOLIS, March 13 — O. F. G. Musgrave, head of J. G. Howard & Co., Ltd., of Sydney, Australia, distributor of the Stutz, is visiting the Stutz factory. Musgrave warns American exporters that in framing their policies toward distributors and dealers in the Antipodes, automobile manufacturers should realize that Australia is not a manufacturing country. He says it is almost impossible

to have a replacement part manufactured in Australia at anything except prohibitive prices, and then there is no assurance of its quality. All American cars should be supplied adequately with parts and thoroughly tested before leaving the factory, he says.

Supreme Court Refuses to Open Pandolfo Case

CHICAGO, March 14 — The penalty imposed by the Federal Court in Chicago three years ago upon Samuel C. Pandolfo for using the mails to defraud in connection with the promotion of the Pan Motor Co. of St. Cloud, Minn., must be paid. The United States Supreme Court has just announced its decision refusing to review the case, the Circuit Court of Appeals having upheld the district court.

Pandolfo was sentenced to serve five years in the penitentiary on each of four counts, but the court held that the sentences on the first and second and the third and fourth counts should run concurrently, making the total period of imprisonment ten years. In addition he was fined \$1,000 on each count.

The Pan Motor Co. case attracted a great deal of attention. The Government charged that although the company had a plant at St. Cloud and had made a few cars the principal business of its promoters was selling stock, and that misrepresentations were made in the sale of the stock.

CAUTION PLATE CHANGED

NEW YORK, March 12 — The motor truck committee of the National Automobile Chamber of Commerce has made a slight change in the new caution plate, recently adopted. At the request of the manufacturers of electric trucks, a space will be provided on which the battery weight will be stamped.

Madrid Allots Space for Show Next Month

MADRID, SPAIN, Feb. 24 (by mail) — Thirty-two car and truck lines have been definitely assigned space in the forthcoming international automobile exposition which will be held here from April 10 to 29. Most of them are of European manufacture, but a report of the organizing committee shows the following American lines: Chevrolet, Essex, Ford, Gray, Hudson, Lincoln, Packard and Moon.

The organizing committee, it is stated, is rather disappointed at the small number of American vehicles which will be shown at the exposition, which is the first ever held at Madrid and the only one scheduled to be held in Spain this year.

The Barcelona show, which took place in the spring of 1922, will give way to the Madrid exposition and will not be repeated until 1924, making the exhibition here the only one for this country. The large business being done by the American companies is in no way indicated by the small number of stands allotted to the American vehicles.

The European lines which will be shown include Ansaldo, Armstrong, Auto-Metallurgique, Berliet, Alfa-Romeo, Amilcar, Berna, Bianchi, Bugatti, Chenard-Walcker, Citroen, Delage, Elizalde, Farman, La Licorne, Mathis, N. A. C., Peugeot, Rolls-Royce, Stoneleigh, Sunbeam, Vermorel, Victorian and Steyr.

The motorcycles include A. B. C., Cleveland, Daly Thomann, Drilan, Chater-Leal, Humbert, McKensie Coventry, Piamant and O. K. B. S. A.

The tires are Bergougnan, Continental, Goodrich and Goodyear.

A number of body builders and local accessory distributors also will take space.